AUGUST 1982
75p

COMPUTER & VIDEO GAMES



Your chance to design an electronic game Details inside

HAUNTED HOUSE

ROBO-RUN

Our first game for the Spectrum

Plus listings for the ZX81, BBC micro, VIC, Tandy and many more inside

THE LOT OF THE COMPUTER WIFE

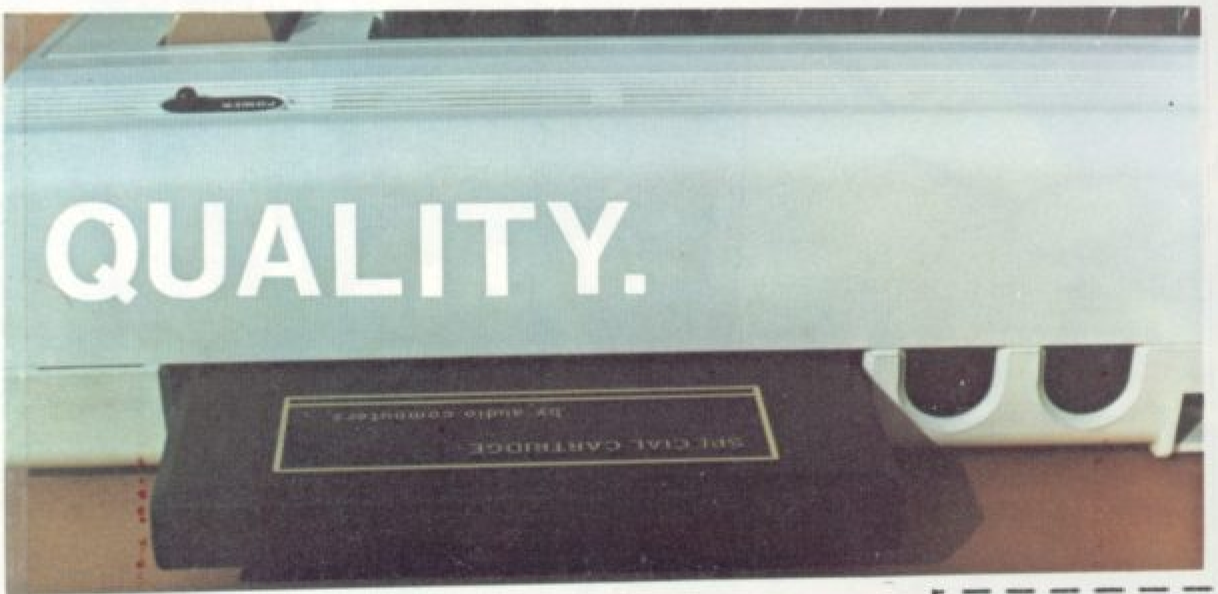
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AUGUST 1982 No. 10



Kenny Sansom (left) and Steve Coppell try to take England to the World Cup final by computer — before flying off to Spain for the real thing.

My wife doesn't...

Does your wife understand the microchip or does she still switch the ZX81 off when you've popped down the local for more inspiration with a 16K program three lines away from completion. Or how about your Mum? Does she still call you for dinner when you're just four shots off the Space Invaders' record?

Well, look at it from her point of view. Here we present the sorry tale of one woman's struggle to get to grips with new technology in the living room. Page 25.

We set England soccer manager Ron Greenwood a real challenge. "Win the World Cup on our Sharp", we said. Find out how he got on... Page 13.

News & Reviews

Listings







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THE "STARWARS OF THE 80's"

NEXT MONTH

Tron lives inside a mainframe computer. He is referred to as a "Program" and he fights for the "users". He has also given his name to the Walt Disney film which is set inside a huge games computer. The film has just opened to rave reviews in the U.S. and will be in London's Odeon Leicester Square Cinema from October 21.

The film is unique in combining real actors, animation and some superb computer graphics and has been tipped as the "Star-Wars of the 80's" by those privileged enough to have seen it.

Our September issue gives two pages and the front cover over to this marvellously imaginative film, which is quite different from the usual Disney offerings.

We look behind the scenes at the graphics men behind the film, a review of the film itself and a rundown on the huge boost it is already giving to the video games and computer games industry, both here and in America.

WHAT'S THE ANTIMATTER?

NEXT MONTH

Our Science Fiction author, David Langford is back with another offering. He takes the concept of anti-matter and shows how it can be used in a computer game. And as usual comes up with a listing to illustrate his points.

Have you ever dreamt up your perfect computer game but felt that the programming skills necessary to convert it to your computer were beyond you?

Next month we are offering the perfect solution. In conjunction with Sinclair Research and Psion Computers, we are challenging readers to come up with an original idea for a computer game.

Sinclair are putting up five prizes for the best ideas, but more interesting for you aspiring games writers, is the chance to put your name to a game marketed through Sinclair. More details next issue.



DEFENDER IN ONE "K"

NEXT MONTH

On the games front, we have a Mini Defender in 1K for the unexpanded Sinclair ZX81 owners. The ghosts of Pacman are ready to chase those of you with a VIC-20, plus Colditz, Star Wars, Bomber and many more listings for you to key-in to your machine.

And as an extra bonus for everyone who has an interest in the BBC Microcomputer, the Owl supplement makes a comeback with issue two. It includes some marvellous tips and programs and if you thought colour was impossible in mode seven — then think again.

It's all wrapped up in a Tron cover, look out for it at your newsagents next month or fill in the form below to make sure of your copy.

I would like to take out an annual subscription. I enclose a cheque/P.O. for £10, (£20 overseas) for twelve issues. Computer & Video Games, Bretton Court, Bretton, Peterborough PE3 8DZ.

Name ____________________

Address ____________________

K1

Computer & Video Games.
The magazine that makes computers fun.

LAST CHANCE TO TAKE IN PARIS

This could be your very last chance to go to Paris at our expense. If you have a game for any machine which you think we ought to publish, then we want to hear from you.

Come October, Computer & Video Games will be a year old and the writer of the best game to be published in the magazine in that first year will be treated to an all-expenses-paid trip to Paris with any friend he (or she) may care to take along.

We already have some idea of the games we most enjoyed trying out in the office and those reviewers who have tested games have also given us some forthright opinions on their favourites.

But the perfect computer game still has to be written and the judges will wait until the last moment before pronouncing on the selection.

However, we would also like you readers to have a say in the result. So if there is a C&VG game which stands out in your mind as giving the most hours of fun, please write in and let us know.

We want to know the name of the game and why you gave it your vote. After all it's your magazine so it's important that your opinions influence the result.

Write to: the editor, Computer & Video Games, Durrant House, 8, Herbal Hill, London EC1R 5JB.

WHO BEAT THE BUGS?

How did you fare in our June issue's Beat-the-Bugs competition? We've just finished sorting through the entries and, although this puzzle was thought to be more difficult that our first program a puzzle solution, the standard of entries seems just as high. The winner's name will be published in our September issue.

Did you choose the right three sides in our World Cup competition? If you rightly predicted the champions, runners-up and third-place play-off winners you are in the running to win an Atari TV games console. Watch our Competition pages next month.



"...the quality of the colour display is excellent". Popular Computing Weekly.

"The graphics facilities are great fun". Personal Computer World.

"...the Spectrum is way ahead of its competitors". Your Computer.

"The world's best personal computer for under £500."

Clive Sinclair

Sinclair ZX Spectrum

16K RAM £125, 48K RAM £175.

This is the astonishing new ZX Spectrum – a powerful professional's computer in everything but price!

There are two versions – 16K or a really powerful 48K. Both have a full 8 colours, sound generation, a full-size moving-key keyboard and high-resolution graphics. Plus established Sinclair features such as 'one-touch' keyword entry, syntax check and report codes!

Key features of the Sinclair ZX Spectrum

Full colour – 8 colours plus flashing and brightness-intensity control.

Sound – BEEP command with variable pitch and duration.

Massive RAM – 16K or 48K.

Full-size moving-key keyboard – all keys at normal typewriter pitch, with repeat facility on each key.

High resolution – 256 dots horizontally x 192 vertically, each individually addressable for true high-resolution graphics.

ASCII character set – with upper- and lower-case characters.

High speed LOAD & SAVE – 16K in 100 seconds via cassette, with VERIFY and MERGE for programs and separate data files.

The ZX Printer – available now

The printer offers ZX Spectrum owners the full ASCII character set – including lower-case characters and high-resolution graphics.

Printing speed is 50 characters per second, with 32 characters per line and 9 lines per vertical inch.

ZX Microdrive – coming soon

Each Microdrive will hold up to 100K bytes on a single interchangeable microfloppy – with a transfer rate of 16K bytes per second. And you'll be able to connect up to 8 ZX Microdrives to your ZX Spectrum – they're available later this year, for around £50.

How to order your ZX Spectrum

BY PHONE – Access, Barclaycard or Trustcard holders can call 01-200 0200 for personal attention 24 hours a day, every day.

BY FREEPOST – use the coupon below. You can pay by cheque, postal order, Access, Barclaycard or Trustcard.

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Please drop us a line at: Computer and Video Games, EMAP, Durrant House, 8 Herbal Hill, London EC1R 5JB.

PUZZLED BY THE PYRAMID

Dear Sir,
Whilst reading Keith Campbell's Adventure column in the February issue, I was most intrigued as to his comment on the availability of Pyramid of Doom, stating that it runs on TRS-80's, Video Genies, Apples and Pets.

I happen to know they are also available for the Exidy Sorceror, but never have I found any of the Scott Adams Adventure series for the Pet.

I have searched high and low for them, and have only found Adventureland and Pirate Adventure for the Pet, and they are in Basic. I would therefore be extremely grateful if you could tell me where I could get hold of the rest of the series, as I am an Adventure addict — well almost! — having several for use on a friend's Apple, but only two on the Pet, they being Hitch Hikers Guide and a version of Microsoft.

E. Armstrong,
Pinner,
Middlesex

Keith Campbell replies: You are absolutely right! I was in error stating that Pyramid of Doom is available for a Pet.

I based this statement on too brief a glance at a Creative Computing catalogue which had separate pages for different machines. The Pet page did indeed list Pirate Adventure and Adventureland, whilst the other pages listed more than just these two. Unfortunately I did not look closely enough at the Pet page. However, your letter has made this all very clear now — my apologies!

Incidentally, I hope I won't be sticking my neck out by saying that the Scott Adams series is now available for the Atari computer.



SEARCH FOR HARDWARE

Dear Sir,
First I would like to congratulate you on a fine magazine. As a complete newcomer to computers, I have found it extremely interesting and helpful.

I recently purchased a second-hand Sinclair ZX81 and with the help of your magazine, have found that already I am beginning to understand how programs work, and have been able to modify some of the ZX81 program listings you have published. However, I have two problems you could perhaps advise me on.

First, obviously the capabilities of the ZX81 are limited, and I am wondering whether it would be better to invest in ZX81 add-ons or to invest in a better machine.

Secondly, I have an Intellivision games console and wonder whether anybody makes add-on hardware that could be used, i.e. keyboards, memory etc, that would turn the games console into a workable computer. I am aware that Intellivision intend to market a keyboard unit, but this seems a long time coming. I have been waiting two years for such a device already.

I am by trade an electrical engineer, and therefore would be able to construct anything that was available.

Considering, that there are reputed to be more Intellivision consoles about than ZX81's I'm surprised that I've seen nothing advertised in this vein. Perhaps there are technical difficulties.

G. Coleman,
Worthing,
Sussex.

Editor's reply: The peripherals and software market is advanced enough to turn your ZX81 into a pretty impressive machine Mr Coleman. They can certainly add a good keyboard, high resolution graphics, and colour.

Mattel will be the only people launching an Intellivision keyboard in this country. It will be distributed by ACE and won't be out until the very end of 1982 and will be expensive in comparison to some of the new microcomputers which are reaching the market.

BLANK LOOKS FROM ZX81

Dear Sir,
Last Christmas I purchased a ZX81 computer. I had previously used a Pet belonging to my school

Now I am greatly disappointed. To start with my computer would not load, and I found the computer would continuously "crash". Now it will not switch on and only shows a blank screen.

I am writing hoping that you could advise me on the best course to correct the fault.

Guy Smith,
Banbury,
Oxfordshire

Editor's reply: There are many reasons why the ZX81 has the problems you list. First, it could be one of the duff machines, if so, send it back and get it replaced. You can see from the letter below the choice of tape recorder is rather sensitive, and probably accounts for loading problems.

AUTOMATIC AGGRAVATION

Dear Sir,
I am having trouble loading and saving my own programs on my ZX81. I use a Philips AR113 which has an automatic recording level. Does this affect the saving in any way?

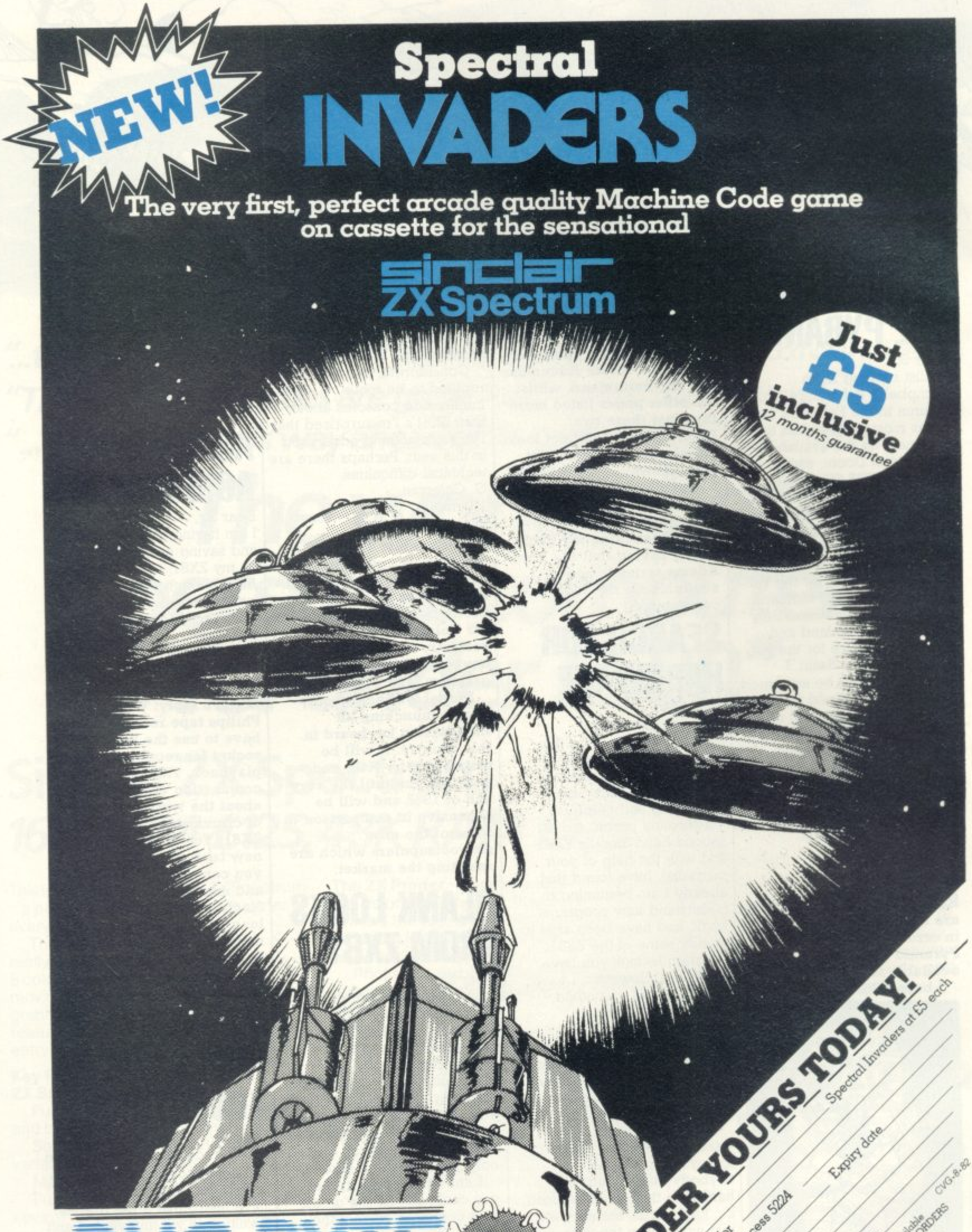
P. S. Murphy,
Chiswick,
London W4

Editor's reply: With the Philips tape recorder you have to use the 5-pin DIN socket for recording and playback. This, in conjunction with the ARL is about the worst combination of circumstances for the ZX81. You really need a new tape recorder, where you can use the earphone and microphone sockets. Sinclair have produced a long list of appropriate machines and it would be worth your while sending them an s.a.e. — to 6 Kings Parade, Cambridge — and asking for their technical data.

HOPES FOR ADVENTURE

Dear Sir,
I have recently bought an Atari 400 computer and I would like to find out more about it. I have heard that it has graphic faculties as yet unrevealed and I hope that **Computer and Video Games** will spill the beans. I also hope to see an adventure game soon.

Mr Beza Siddiqui
Greenford,
Middlesex



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MAILBAG



FILLING IN THE HORIZON

Dear Sir,
I have the use of a North Star Horizon computer and when I asked a friend about the use of graphics he told me that instead of POKE, FILL could be used.

I experimented with FILL but could not get any results. Please could you tell me how graphics are used on the North Star Horizon as the only games I can play are adventure games which don't involve graphics?

Stephan Evans,
Bodenham,
Hereford

Editor's reply: I can't really answer this as it depends on the type of video board in your system. Most graphics boards do not allow memory mapped graphics — which is what POKE and PEEK are specifically for. As you are using a VDU to display the video signals, the methods used depend on this, the graphics board and the Basic.

HELP! I'M BEWILDERED

Dear Sir,
I have only been involved in computers for about nine months and practical computing for about one month and am therefore totally bewildered by the whole thing.

I am saving up frantically for a computer and I have a couple of questions to ask. Why is the ZX81 so much cheaper than its nearest rival? What's the difference?

In the April *Mailbag* someone asked what the cheapest price for a memory expanding pack was. Could you tell me if the same is true for the computer itself?

Ian C. Feast,
Bournemouth

Editor's reply: The ZX81 is mass produced. This combined with some clever design techniques allows it to be sold cheaply. It has a limited application and within these limits does things very well. Other, more expensive, computers can do more. If you only want to do single things then why pay for something you don't need?

New memory units are available for the ZX81 all the time. Now that Sinclair have reduced the 16K RAM to £29.95, this seems the best buy.

TEACHER FOR THE APPLE

Dear Sir,
My father owns an Apple II Plus, for which we bought a number of games.

As he is now thinking of buying the Wordstar word processing system he is about to buy the Z-80 Softcard for its CP/M language. What extra games will I be able to play on the Apple once the Softcard has been installed?

I am a very keen reader of your magazine and copy nearly all the Apple games you print.

Angus Winchester,
Iffley,
Oxford

Editor's reply: There are many games running under CP/M. As this operating system is mainly designed for business use you will probably find that most are available on the Apple already. I don't hold much hope for any new ones, especially as the Apple has a rather idiosyncratic method of implementing CP/M.

SATISFIED READER

Dear Sir,
During the course of the present month I have discovered your fabulous magazine. I am very impressed with the amount of information you manage to supply. On reading the March issue, I have found a great number of ZX81 software suppliers, previously I knew of none.

M. McKenzie
Ipswich
Suffolk

TANTALISING PROGRAMS . . .

Dear Sir,
As a relatively new user of computers and owning a Sinclair ZX81 my knowledge of the Basic used by other computers is very small. I would be grateful if you could inform me if there is a book that will change the Basic used in the tantalising programs you write for other computers, to that of the ZX81's Basic.

Kevin Hewitt,
Longhope,
Gloucestershire

Editor's reply: Quite honestly the most comprehensive booklet on Sinclair Basic is the ZX81 Instruction Book! Unfortunately the information is not in any logical order! You have to read through it about ten times to find what you need. There is no book that will do the "translating" for you.



CHILDREN'S FAVOURITES

Dear Sir,
Although I enjoy reading your magazine very much and find the contents very good I think it could be bettered by the addition of a so-called children's page.

This could contain programs written by children and competitions. It would also contain letters and queries and some hints. After all, with the increasing number of micros being used at school, a lot of your readers are children and if there was a children's page it would be easier for them to get their program printed.

John Hunter,
Midlothian,
Scotland

Editor's reply: In our experience children are quite capable of taking the lead in the microcomputer gaming world John. Certainly many of our games are sent in by young contributors and I would hate to patronise them by including their offerings on a children's page. One of the fastest and best machine code space invader games I have come across was written by a 16-year-old. The upshot is that you youngsters can force your way onto our pages without us making any concessions.

VERY SORRY PEOPLE . . .

Dear Sir,
We would like to apologise to all our customers for any delay or inconvenience caused on orders received by Anglo American Software.

This was due to an internal staff problem. Orders placed before May 10th have been mislaid, and would anybody who has sent an order to us please contact us as soon as possible.

Mike Davies,
Anglo American Software,
Birmingham

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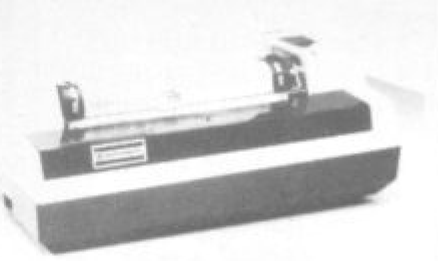
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WIN A BALLY PINTABLE

Bally's marvellous Electra pintable takes pinball just about as far as it can currently go.

Pinball fanatics will know it as the three level pintable which adds a mini-playfield to the excitement of a two tier game. This pinball machine will go to the home of the lucky winner of our pinball competition.

And the winner could even find his ideas incorporated in a future Bally pinball design.

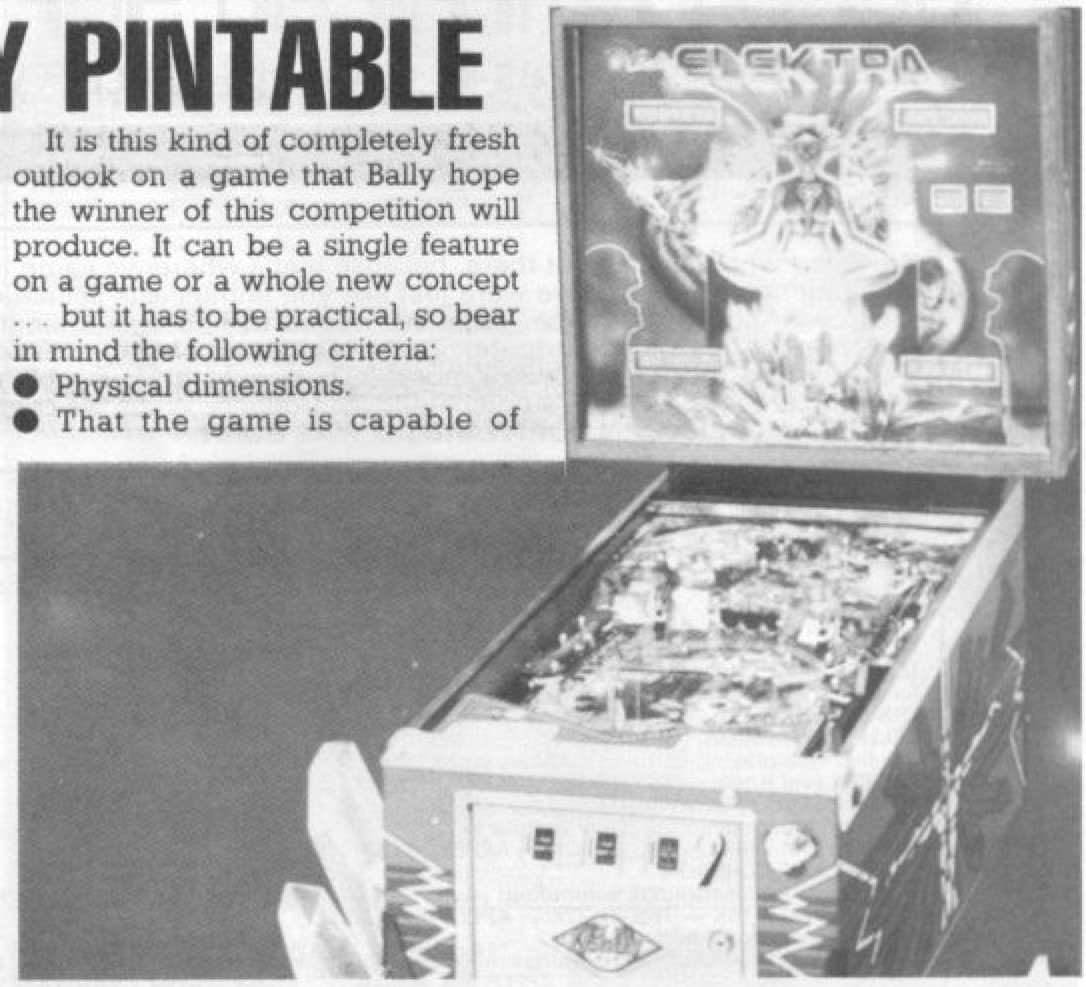
So how do you win an Electra pintable for your own living room, bedroom or hallway? Simply by being original. We want you to come up with an idea for a feature on a pintable — or any other arcade game — which you think would greatly enhance its playability. Or you could come up with a completely new machine.

You'll have to go some to match the current crop of pinball designers, who have introduced some pretty impressive features lately. The Electra itself is a good example of many of these and we have gone into some of these, below. But among the many innovations, currently pulling people into the arcades are: drop targets, playfields on more than one level, captive balls, pinballs that talk back to you or the Vector's machine's flip-o-meter.

Pinballs have also found a new direction recently. The Williams' Hyperball and Bally's Rapid Fire (reviewed on page 27) have given a new twist to the pintable by turning them away from the usual keep-the-ball-in-play strategy, to a firing game, shooting balls at lit targets.

It is this kind of completely fresh outlook on a game that Bally hope the winner of this competition will produce. It can be a single feature on a game or a whole new concept . . . but it has to be practical, so bear in mind the following criteria:

- Physical dimensions.
- That the game is capable of being mass-produced.
- Cost.
- Weight.
- That it is safe to be used by the arcade player.
- The idea must not be stolen from any other arcade or pinball machine.
- And most important, it should be creative and original.



The Bally Pinball Division will present an Electra pinball machine to the grand prize winner. All entries will be judged by the Bally Pinball Division's new product board and announced in Computer & Video Games. All entries will be the property of the Bally Pinball Division and the entrants will assign all rights, patents and privileges of their design to the Bally Pinball Division.

No employees of Bally or Computer & Video Games or their relatives may enter the competition. The judges decision is final and no correspondence will be entered into.

Send your entries to The Pinball Competition, Computer & Video Games, Durrant House, 8 Herbal Hill, London EC1R 5JB before September 16th 1982.

More features than *Cosmopolitan*, is one way you could bill the Electra pintable. For pinball buffs, we'll just outline a few of these.

The first difference you will notice is the split-level playfield, which has two upper tiers and a central mini-playfield.

On the upper level you'll find stand-up targets, rollover buttons and a saucer arrow which will release another captured ball. Drop targets and a stationary target combine to produce a boot-a-ball multiplier.

Passage to the third, mini, playfields is achieved by collecting Electra time units on the upper levels. Each sequence of hit targets leads you into new possibilities. Now take a deep breath and vow never again to refer to any arcade machine as: "Just another pintable".

BRAINWARE ANSWERS

The answers to our July Mind Routine problem is:

Billy Bashem 59 pts. vs. Roger Rellem 52 pts.

15 reds, 5 yellows, 1 green, 2 browns, 6 blues, 4 pinks and 3 blacks (giving a total of 111 pts.).

The correction solution to last month's Nevera Crossword is printed right and the winners names will be published in next month's issue.

For more puzzles turn to page 80 for Mind Routine and Nevera Crossword.

M	O	N	O	P	O	L	Y	M	O	N	E	Y
O			X			E			X			
O	S	B	O	U	R	N	E		I			C
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E			O		B	I	S	E	C	T	P	I
			T			N			O			C
R	E	S	E	R	V	E	D	W	O	R	D	S

WORLD CUP SHOCK



There was really only one way to put our June issue's World Cup Manager game to the test. And that was to get a national squad manager to play it.

So we invited England's manager Ron Greenwood to test out his soccer skills against the computer.

Ron graciously accepted the challenge and just before the England squad flew out to Spain, Sharp sent three computers (complete with the game) down to the squad's football headquarters at a Hertfordshire hotel.

Several other members of the squad also tried their hand at the game with Steve Coppell and Kenny Sansom being the notable successes.

Between them they guided a rather strange England line-up through the first round and with Kenny in charge the team narrowly failed to qualify for the semi-finals on goal difference.

Ron fared rather less well. With a team that consisted of: Corrigan, Mills, Foster, Sansom, Wilkins, McDermott, Coppell, Keegan, Mariner, Woodcock and Rix, Ron took on Hungary in the first game of his tournament.

C&VG's editorial assistant, Susan Cameron, helped Ron to key-in the opposition names and choose his tactics. And the result?

England lost 7–0! Well we never said the game was easy . . .

But he ran into a few tactical problems, like being forced to bring on substitute Peter Shilton, in the attack after a disappointing first half showing, in which the Hungarians claimed most of the midfield and stamped their authority on the game early.



Confessions of a Bug

Machine code! What on neutral gave the editor the impression he could sneak that past us?

The Bug hasn't been born who can't put a spanner in the works of a machine code listing. Snag Junior got to grips in line 1 which has a real question mark over it.

Unfortunately author Pat Norris, soon spotted the problem and came up with a subroutine which makes data entry into that first line much easier. First of all replace line 1 with 45 fullstops.

```
1 REM (45 full stops)
```

Next type in the following short routine:

```
3000 FOR A=16514 to 16553
3010 INPUT B
3015 POKE A,B
3020 NEXT A
3025 STOP
```

After this short program has been typed, type in GOTO 3000. The cursor will appear, awaiting input. Put in the following data:
33,215,64,17,43,117,35,126,167,254, 118,32,7,35,35,35,35,35,24,242,254, 23,32,1,201,214,28,135,135,135,135, 35,134,214,28,18,19,35,24,223.

After the data has been entered, delete lines 3000 to 3025.

One other point is that the asterisks in line 65 are two multiplication signs and NOT a power sign.

Also a piece of rogue paper obliterated a part of Pontoon during the printing process-ably abetted by T. Hitch. Line 133 suffered as a result:

```
133 IF V=2 AND A=21 THEN PRINT "YOU HAVE BLACK-JACK"
```

is the correct version.

Moonshuttle was left to Screaming Foul-up but he couldn't do much with it (he's not been well recently). But the printed version was for use with the keyboard rather than a joystick. The J in line should be changed to 37137 if you wish to use joysticks to play the game. Bye for now.

yours Mal

GAMES NEWS

WIN YOUR FORTUNE ON THE HIGH SEAS

BARGAIN BYTES TWO



Avast landlubbers! Here's your chance to take to the high seas in search of fame and fortune.

It's up to you to work your way up the ship's hierarchy, from cabin boy to admiral of the fleet, in a story similar to that of the fictional Captain Hornblower.

Once aboard the good ship ZX81 you must use your seafaring talents to win promotion by fearless performance in battle. Skilful use of resources is vital while sailing the seven seas. Supplies men and ammunition must be carefully calculated and finely balanced.

The journey is hazardous and the battles fierce but a determined player can battle his way up the ranks to become First Sea Lord.

Sea Adventure is one of eight games featured on Bargain Bytes Two. Other major games on the cassette are Stock Market, in which the player must make instant buying decisions as market information flashes up on the screen.

Noughts and crosses, with three skill levels, a fruit machine game, complete with random holds, nudges and a winnings counter and a moving graphics Ski Run game are also on the tape.

The rest of the cassette includes educational games, a general knowledge quiz, an alphabetical Simon game and a money calculation puzzler.

Bargain Bytes Two is available from Richard Shepherd, of Maidenhead, Berkshire. It needs a 16K RAM pack and costs £5.00 including postage and packing.

THE MAZE MASTER AGAIN!

ATTACK-MAN

No computer is complete without a version of that master of the maze, Pacman.

The latest to sport a copy of this busy little creature and his antagonistic cohorts, is Texas Instruments' underrated T.I.99/4a.

As usual the player must guide this hungry alter-ego through a maze-gobbling points and avoiding the monsters.

The cassette costs £6 and is available from Stephen Shaw of Stockport. Coming soon, from the same source, are more T.I. programs which are being brought over from the Canadian Norton Software catalogue.

TO WORK ON AN EGG

SPACE PIRATES

Yo Ho Ho and a basket of eggs! What's this — have all those rough tough pirates gone soft in the head! No, they are still hard boiled characters, but you could say that this latest addition to games tapes for the BBC Microcomputer is a real cracker!

In Space Pirate you really go to work on an egg. On screen is an asteroids type spacecraft which you control to defend a clutch of space eggs under threat from some thieving aliens.

Once an egg has been snatched however your only defence is to shoot it. Then it turns into your next spacecraft. If you miss all the snatched eggs then you'll end up minus your trusty ship and nothing for breakfast.

Space Pirate runs on the model A machine in 16K, and the tape comes from Bug Byte of Liverpool and will cost around £8.00.

Bug Byte are working on other games for the BBC machine, including a chess tape with 1,000 — yes 1,000! — skill levels, and Polaris — a submarine warfare game for the model B using high resolution graphics.



WIPE OUT THE NASTIES

VIC PANIC



The only way to deal with some monsters is to trap them in a pit and hit them on the head with a shovel!

That's the aim of the little character who inhabits the VIC Panic maze.

You are in control of this little chap who, armed with a spade, rushes around the maze digging pits and trapping monsters. The aim is to wipe out all the nasties and collect a high score.

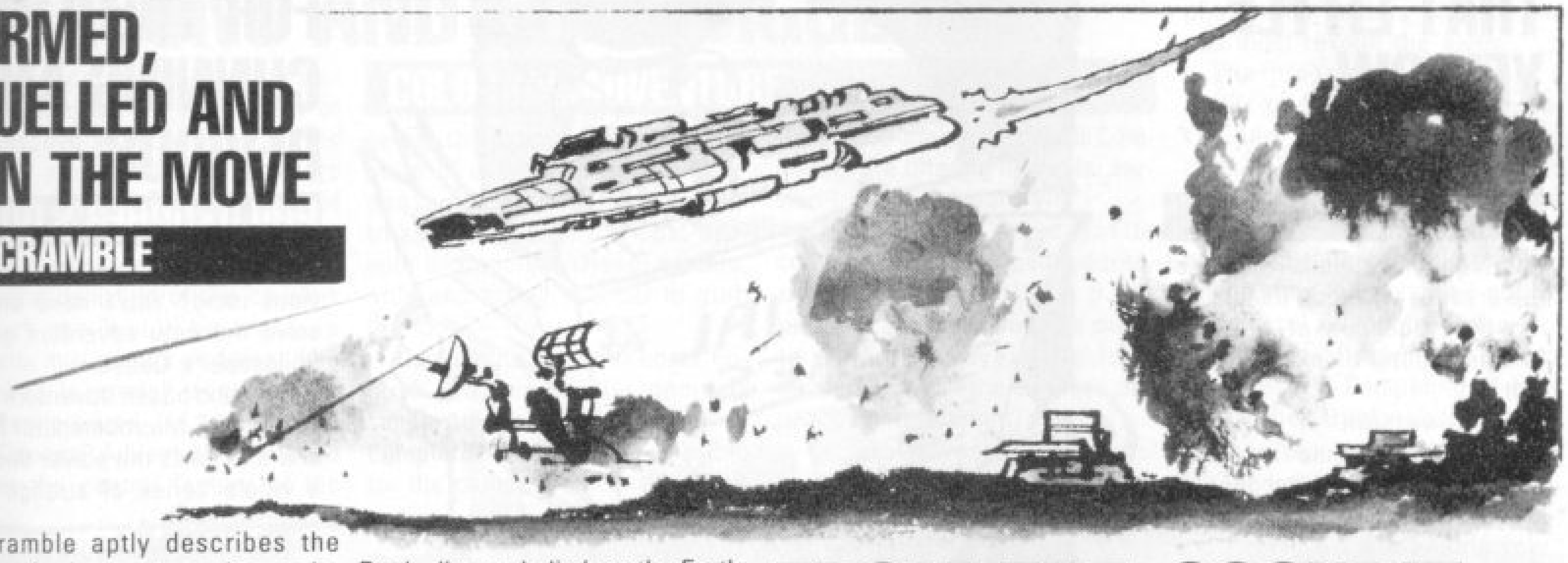
The game is similar to the arcade Space Panic machines and runs on the unexpanded VIC-20.

The cassette is available from Liverpool-based Bug Byte and costs £7.00 including postage, packing and VAT.

GAMES NEWS

ARMED, FUELLED AND ON THE MOVE

SCRAMBLE



Scramble aptly describes the player's desperate antics as he attempts to score points above a world on which he is barely equipped to exist!

Already a big arcade success, the game puts you in charge of a plane, armed, fuelled and on the move across a mountainous landscape.

Quicksilva is the company responsible and it is quickly making a name for itself for adapting arcade games onto the limited graphics facilities of the ZX81. This version costs £4.95 (including post and packaging) and allows up to five ships to appear on the screen at any time and has the fuel dumps, ground defences and changing terrain of its video predecessor.

ROBOTIC GENOCIDE

BERSERK

Berserk was the strange name given to the game of robot genocide which frequented arcades last year.

It crops up again on one of the games cartridges which can be bought for the new Dragon 32 microcomputer. The Dragon is being manufactured in Swansea and is a division of toy company Mettoy.

Berserk challenges you to escape from a room full of robots without running into the walls, the robots, or their bullets.

The game comes in cartridge form to slot into the computer and costs £19.95. Other games cartridges currently available are. Cosmic Invaders, Meteoroids and Ghost Attack.

FROM THE COCKPIT

FLIGHT SIMULATOR

Bank, dive and climb as the Earth travels past beneath your feet — or actually it's on your TV screen which has been transformed into a cockpit window.

Flight Simulation is the name of the game which is one of a series of five being produced for Sinclair by software house, Psion.

The simulation places you in a cockpit of an aircraft.

The sky and the ground move through this window, and although it hardly bears comparison with the multi-million pound flight simulators which real pilots train on, it does offer some of the excitement and a very real challenge.

The tapes are marketed under the Sinclair label and will be available from the company or your local W. H. Smith for ZX81s with a 16K Rampack. Flight Simulation costs £5.95 and the other programs are:

Fantasy Games which retails at £4.75 and offers two adventures in a Perilous Swamp and on the Sorceror's Island.

Chess costs £6.95 and has six levels of play with a chess clock on which to time yourself.

Backgammon, the gamblers' favourite dice game has a graphics board, rolling dice, and doubling dice for £5.95.

The space invaders look-alike, Space Raiders shares a cassette with the familiar City Bomb type game, Bomber and retails at £3.95.

DEATH LURKS IN SPACE

INVADERS AND ASTEROIDS

Take your ZX81 where no Sinclair has gone before. Out in the darkest reaches of space lurk the Invaders and deadly fields of fast moving asteroids all out to do you terminal damage.

Both games include most of the features of the arcade favourites and are written entirely in machine code for fast and furious action. Invaders has 10 skill levels, a high score listing, flying saucers, a bonus feature and realistic invader movement.

Asteroids has 10 skill levels, a wrap-around screen, five attack waves and those flying rocks come in three sizes. There is also a high score listing and bonus feature.

Invaders and Asteroids will run in 4K of RAM and are available from Silversoft, Bader Park, Melksham, Wiltshire, or the London based Small Enterprises. Invaders costs £4.95 and Asteroids will set you back £5.95.



GAMES NEWS

THAT LITTLE YELLOW FELLOW

SNAPPER



Pac-Man, that cheerful glutton of the arcades will soon be inhabiting the recesses of the BBC Microcomputer thanks to Acornsoft.

Their version of the well known video game is called Snapper — named after the yellow creature which chomps its way around a maze.

The game — a faithful reproduction of the original — is easy to play using four well-placed keys on the BBC keyboard which guide the hungry Snapper around the maze.

Snapper has even chomped his way into the respected pages of the Financial Times. Bowler hatted city gents were told that Snapper is "a little yellow figure" and he "moves about a sort of maze and scores points by gobbling up little wafers, power pills and ghosts. The longer you keep him alive the more points you score. If he eats all the video wafers he gets another life. But he can be destroyed by the ghosts and can only eat them if he has first eaten a power pill." So now you know.

The maze appears in eight colours — using the BBC microcomputer mode 2. There are also sound effects — including gulping noises as the Snapper eats its way around the maze and an audible warning when the little creature has eaten a power pill and is able to chase and devour the ghosts.

Snapper includes a high score table. To qualify for a place you have to score at least 1000. The average beginner should score about 4000 points. The highest so far is 100,560 according to Acornsoft.

Acornsoft Snapper is available from Small Enterprises.

FOR THE CUNNING AND DEVIOUS

PHILOSOPHER'S QUEST

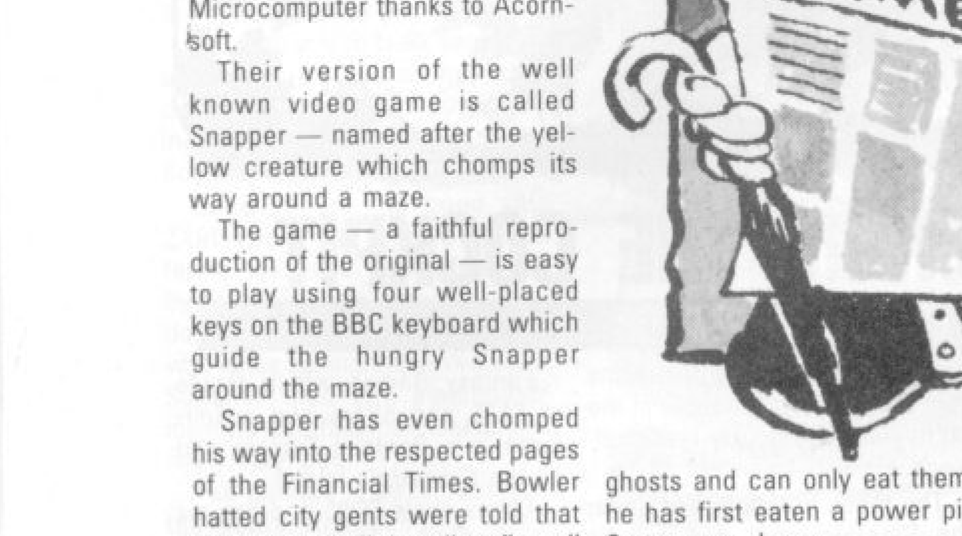
Do you have a cunning and devious mind? You'll need one to solve the new adventure game, Philosoper's Quest.

This text based adventure runs on the BBC Microcomputer Model B and takes the player through a whole series of strange settings.

The usual adventure format of command words is used to help the budding philosopher along on his search for the ultimate truth. During his search he has to overcome several what the devious programmers of Acornsoft, refer to as "cunning puzzles" on the way.

Part of the action takes place in an underwater scenario but there also puzzles to be solved on dry land in peculiar rooms as well as out in the open. But I promised not to give too much away so I'll stop here, if you want to know more . . .

The game is available from Cambridge-based Acornsoft and costs £8.65 plus VAT.



MEET THE SUPER BIKES

TT RACER

Roar off on a high-power racing motorbike for the thrill a minute experience of a TT competition.

A realistic motor cycle rider and his bike are in your hands on this difficult game in which bikes smash into trees, barriers and oil slicks.

You must complete as many laps as possible in this 30 second race. Manoeuvre your biker with the sensitive joystick and see him lean to the right or left from gravitational pull going round the bends.

Absolute control of the bike rests with the joystick, by pushing it hard forward the speed increases quite drastically and usually makes the bike head straight for the nearest tree or other obstacle.

It's best to try slow laps at first to learn the best technique for handling sharp bends. Once you are more experienced you can speed things up and complete more laps.

If you find you are travelling too fast pull the joystick towards you and you'll slow down. The game is for one player only, but that's just as well because additional bike riders would only clutter up the track and make your life more difficult.

Each time your rider crashes the time on the clock ticks away, giving you less chance to notch up completed laps. It is difficult to master the controls of the game but once done you will find it challenging and compulsive to tackle.

It runs on an Atari 800 with 16K memory and is available from Currys stores, Calisto Computers and Maplin Electronics for £19.95. North London based Centaursoft is the producer.

AN ALIEN VETERAN

SPECTRAL INVADERS

Sinclair's new baby, the Spectrum, is fast getting a library of software all for itself.

The latest addition is the Spectral Invaders cassette — a faithful copy of the now veteran forerunner of the video game boom.

It is written in machine code and makes full use of the Spectrum's graphics capability.

The game is controlled by joysticks and has a high score feature, as well as the usual invader antics.

It runs on the standard Spectrum and comes from Bug Byte of Liverpool priced at £5.00 including postage, packing and VAT.

Illustrations: John Davis

GAMES NEWS

DRAGONS AND GOLD DIGGERS . . .

COLOSSAL ADVENTURE

Deep underground in a mysterious land there lies a hoard of undiscovered golden treasures which are talked of in whispers in inns and taverns by groups of strangely garbed travellers.

The treasure is guarded by several denizens of the caverns which the would-be treasure hunter must outwit or defeat if he wishes to snatch some of the glittering prizes.

Colossal Adventure is named after the central feature of the game, the Colossal Cavern — a maze of caves and underground passages containing fabulous treasures. The player must deal with a dragon, a snake, spiders, orcs and a troll in order to grab the loot.

Commands are entered as English phrases so the game is simple to play — but difficult to complete. It should be possible for the player to finish the game — but the makers, Level 9 Computing, are offering a special service to their Adventurers.

Each copy of the cassette comes with a stamped addressed envelope and Level 9 has undertaken to answer one question from a player who finds himself stuck in the caverns and provide the odd hint.

Colossal Adventure has a twist in its tail. Just when the player thinks it's all over it enters a new phase. The cave is flooding and you must rescue the elves.

The program is written in a super-compact language developed by Level 9 called "a-code". This is specially tailored for the production of Adventure games and includes a compiler and a small "a-code" interpreter which runs the compiled code.

Colossal Adventure is the first of a range of Adventure games from Level 9 Computing of High Wycombe, Buckinghamshire. It runs on the Nascom 1 and 2 in 16K and costs £8.00.



IT'S SNOW JOKE ON THE SLOPES

SKI-ING

Ski-ing against the clock may look easy to master but controlling the athletic skier in reality is a true test.

There are two different runs to attempt, a straightforward downhill course and a more taxing slalom race.

You have as many skiers as you need to complete the course within the set time limit, and the boundaries of each course remains the same although the features alter.

The slalom is the more difficult of the races because you have to make your skier twist and turn with agility between the flagged posts.

Hazards abound on the course in the shape of ice patches and log piles. If you ski over an ice patch, which are denoted on screen by randomly placed blue pools, the impact speeds up the skier. That has a tendancy to land you in trouble as it takes time to adjust to the new speed.

If you find your skier hurtling headlong into a pile of black logs press the action button and he will leap over the heap.

An amusing game element occurs when a skier crashes. The game stops and two stretcher bearers run through the trees onto the slope and cart off the injured skier.

Ski-ing was written by Centaursoft and runs on an Atari 800 and costs £19.95 from branches of Currys, Maplin Electronics and Calisto Computers.



A CHALLENGE FOR SPACE CAPTAINS

EARTH ATTACK

Can you pilot a spacecraft on a mission of destruction and return safely to base?

Microtanic Software have issued this challenge to all you space captains out there in the form of their new cassette Earth Attack.

You have to fly your fighter over a rugged terrain of mountains — dodging missiles fired from base on the ground and bombing fuel dumps to ensure your supply is replenished during the mission. If the game sounds familiar that's because it's based on the arcade favourite Scramble.

It comes complete with sound effects and good graphics and runs on the Microtan 65 in 8K or less. It is available from Microtanic Software of Dulwich, London and costs £6.95.

Microtanic also have versions of Defender and a Pac-Man type game called Gobbler.

WHEN EAST AND WEST KEEP QUIET

BRIDGE



The most animated aspect of the card game bridge, is the post-mortem which follows a defeated contract.

But when the Atari TV games console becomes your partner the "How on Earth could you bid four spades with that hand" banter becomes a little one-sided.

Bridge has so far defeated the programmers' efforts to turn computers into club-level players, despite some imaginative attempts. The fact that the game is divided into the two distinct areas of bidding and playing, added to the problem that good bridge players usually combine educated guesswork with a fair amount of psychology, makes bridge a hard game to program.

Beginners and those who wish to relearn bridge skills will find the cartridge useful. It plays seven levels of bridge. The first three are all bidded and played, the other four are just played. It uses the common Alco bidding system and deals out a hand of cards which is displayed on the screen for you, as seen by the South position player.

Your partner North and you are the only two players involved in the bidding — so a rather false picture of bidding systems is built up. East and West cannot double unlikely contracts or outbid you. All of which makes the playing of the finesse (the winkling out of a key card by devious means) very difficult to judge as there are less hints as to who holds the card.

At £24.95, the Activision cartridge only hints at the nuances of this king of card games but it will teach beginners and help fair players sharpen their skills. It is marketed over here by Computer Games.

STAY OFF THE COMPUTER CAR'S TRACK

HEAD ON

Driving a high-powered Formula One racing car can be as hazardous on your television screen as it is in real life.

In Head On the screen is filled with the lanes of a race track which spread outwards from a central rectangle. The car under your control can quickly swop lanes to avoid a head on crash with the computer controlled opposition.

Your driver is luckier than his real-life counterpart. For in this dice with death he has three lives to play with, only the third collision is terminal.

Using the handsets you can regulate the speed of your car. By pushing the joystick to the right you increase the speed. To slow down move the joystick to the left.

The game comes complete with small cards which fit on top of the keypads. These are used for directional control of the racing car.

On the bottom of the screen is a clock which keeps track of the number of miles your car has covered.

There are nine different variations including games for one or two players, a role reversal game in which you have to attempt to collide with the computer controlled car, and a version when two cars are computer controlled.

This game runs on the Acetronic MPU 2000 and is available for £14.95 from all the usual ACE dealers.

NOW DODGE THE GUIDED MISSILES

LASER ATTACK

You are in command of a space armada flying on a warlike mission to a planet in the outer galaxy.

Your mission is to lead a squadron of jet fighters in an attack on the planet's surface. Enemy fire comes from laser cannons placed strategically on the planet. These fire radar guided missiles which home in on your spacecraft.

There are only two enemy cannons to contend with in the first round of Laser Attack. These are only worth one point each.

You have an air fleet of four super-spaceships and can change planes if one is shot down.

After the first two laser bases have been destroyed more appear on the screen. These are worth more points the further you progress through the game. When the eighth cannon has been wiped out each one thereafter earns you 10 points.

To avoid the missiles you must fly your ship swiftly and accurately to confuse the projectile's computer guided system. Your ships are controlled with the handsets by moving the joystick to the left or right, and up and down.

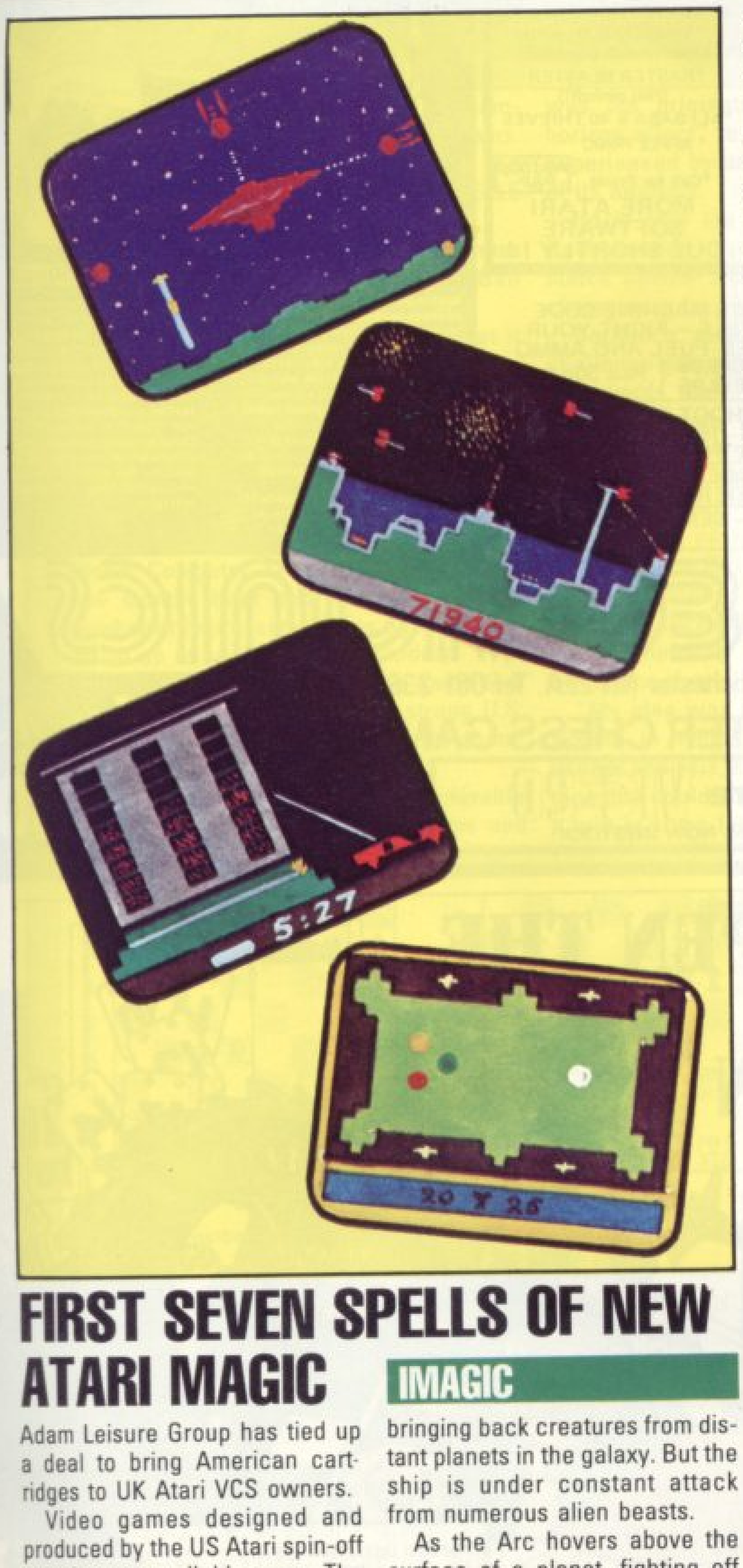
To activate your own weapons push the red button on the handset but take care to aim and fire at the right moment.

Several variations are included in the game with varying degrees of difficulty. Game four only gives you one chance to blast a laser cannon. If you miss a missile will automatically lock on to your craft's position and destroy it.

Laser Attack runs on the Acetronic MPU2000 and costs £14.95 from stockists.



Illustration: Terry Rogers



FIRST SEVEN SPELLS OF NEW ATARI MAGIC

IMAGIC

Adam Leisure Group has tied up a deal to bring American cartridges to UK Atari VCS owners.

Video games designed and produced by the US Atari spin-off Imagic are available now. The firm was set up in America at the beginning of the year offering a range of seven games compatible with the Atari home games centre.

Each one has high quality graphics and some of the games are new in concept and very addictive.

Cosmic Arc is a space destruction game. The pilots of the Arc are entrusted with the job of bringing back creatures from distant planets in the galaxy. But the ship is under constant attack from numerous alien beasts.

As the Arc hovers above the surface of a planet, fighting off the attackers you must send a satellite ship with which to capture the creatures.

The planet is protected by a laser beam which will destroy the satellite craft if it flies into the path of the beam. Keep dodging the laser to catch the aliens.

The Arc weapon sites are in four positions, firing to left and right, up and down. With alien bombardment coming from all sides you need to be digitally dextrous to cope and survive the onslaught.

Riddle of the Sphinx is an unusual scrolling game and a hard one to get the hang of. On the screen appear numerous palm trees interspersed with camels, pyramids and the occasional oasis.

You control a small man whose quest in life is to discover the riddle of the Sphinx. He does this by picking up clues as he walks through the desert, and these are displayed along the bottom of the screen once he has collected them.

Your intrepid explorer needs water for his energy source. Having just quenched his thirst at an oasis he can bound through the sands with a strong stride.

Gradually the heat of the desert overcomes him and his pace slows down, making him extremely vulnerable to hazards like scorpions which have a deadly sting in their tail.

An enemy force constantly harries the tiny traveller firing shots at him. The man is armed with a gun and you score points by helping him shoot any enemies that get in the way.

Other games in the Atari compatible range include space games like Demon Attack, and Star Voyager, a Fire Fighter game in which you have to execute a rescue from a burning building.

There's a version of billiards called Trick Shot, and a sea battle adventure called Atlantis. The submerged city is battling a relentless enemy. Waves of flying foes batter the city's defences. You command three missile installations and must track and destroy enemy ships.

Cartridges are expected to retail at two basic prices, £19.95 or £24.95. They will be available from electrical dealers, big stores and some toy shops.

Imagic also has a range of games packs which are compatible with the Mattel Intellvision games centre.

As yet these are only available in America but in the autumn these cartridges will begin to filter through to UK retail outlets providing a high degree of competition for Mattel and a wider variety of games for television games centre owners.

ALIENS OVER THE CITY SKYLINE

DEFENDER

Defender was the dedicated arcade player's game when the novelty of space invaders wore off and Asteroids had been conquered.

Both space invaders and asteroids converted well to the Atari T.V. Games Centre screen, although both lost some of the challenge of the arcade original.

Defender is the new game to make the transition with Atari continuing its successful policy of buying up the licence to produce the arcade money-spinners under their correct title.

Graphically, Defender is not as impressive as the original but it does capture a good deal more of the playability.

The controls are much more approachable with only a joystick and one fire button, compared to the rank of buttons on the arcade machine.

The planet surface is replaced with a city skyline, behind which your craft can disconcertingly sink, making it difficult to judge your position on the screen.

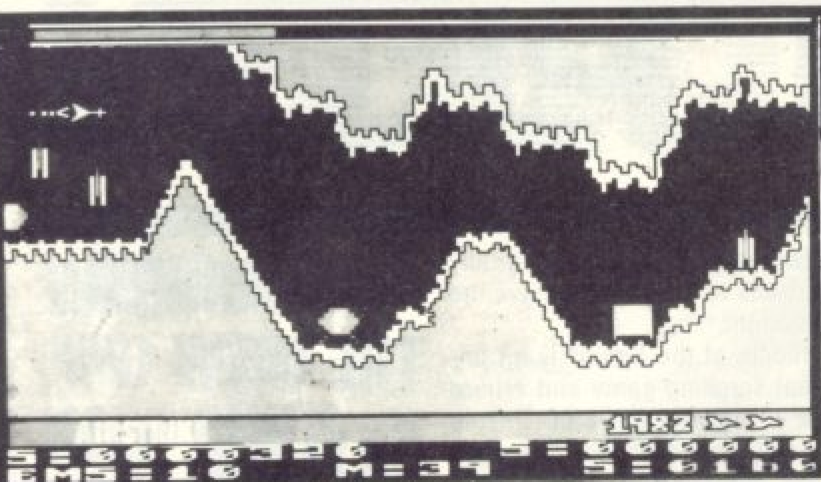
The radar screen is still there, as are all the adversaries you will remember from the arcade, although they do look very different.

The humanoids are still to be found on the surface of the world and must be returned there if the aliens' landers capture them. And the ultimate weapon is still your smart bomb, which destroys every alien creature on the screen.

The attacks still come in waves and every attempt has been made to copy the original as closely as possible. What makes it more challenging than space invaders and asteroids is sheer difficulty. The aliens are very accurate with their bombs and quick to home in on you. They also rush in at you from off-screen positions making it hard to line up your craft.

Atari should have another winner on their hands at £29.95.

Illustration: Terry Rogers



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A complete game encompasses 30 rooms and 20 prizes, and prize capture is not always an easy task; a different technique or twist is involved in obtaining each one. Some require physical dexterity to reach while others can be acquired only through an intellectual problem solving path. Even some rooms are initially hidden from the player and must first be found before their prizes can be captured. Action Quest provides challenges both for fast action players as well as for those motivated by intrigue.

NEW TITLES: ●CRYPTS OF TERROR–16K ADVENTURE ●K-RAZY SHOOT OUT CARTRIDGE ●AMERICAN FOOTBALL–16K ●CAVERNS OF MARS–16K ●COMPUTE BOOK OF ATARI ●SANTA CRUZ TRICKY TUTORIALS

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CHESS



I have talked about human world champions beating chess-playing programs. Now I would like to introduce the strongest chess program of all, BELLE which has beaten several top players.

BELLE is a special-purpose chess machine built by Ken Thompson of Bell Laboratories.

Its processing speed is so great that it can generate a candidate move in one two-millionth of a second and can examine 160,000 positions per second.

BELLE has a stored opening book of 300,000 positions which it scans in just one and a half seconds! It was built out of 1,700 chips in the Spring of 1980, won the World Computer Chess Championship a few months later and has since won a number of impressive games against players of up to senior master standard.

The human opponent for the game that follows was Hans Berliner, a strong U.S. master, who is also a former world champion for correspondence chess.

Berliner has himself spent considerable time writing chess-playing programs and was the originator of the phrase "the horizon effect" to describe the blindness experienced by any program at the limits of its analysis.

He is also the author of a celebrated Backgammon program which won a match against the reigning human world champion a few years ago.

Berliner's motivation for arranging a challenge game against BELLE was, in his own words, that: "I felt it may be getting to the time when I would have my last chance to beat the world's best mechanical chess entity, so I thought I'd better try to do it now."

"It would be foolish to play a normal game against BELLE. It was clearly better than I tactically, so I had to take advantage of its lack of knowledge in some way, while intending to avoid tactical complications if at all possible.

"My idea was to get it into an opening system in which I had private (unpublished) analysis, and hope to get an advantage that could hopefully be converted into a win at some future time."

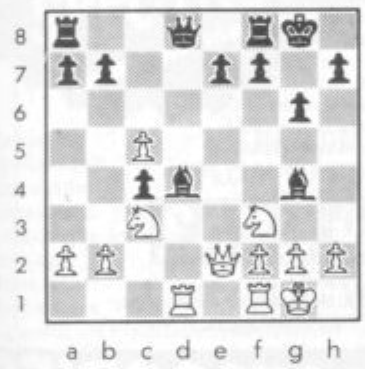


Fig 1. Position after Black's 18th move

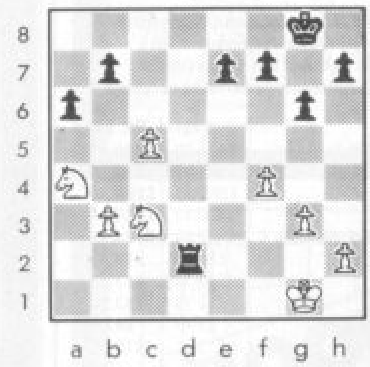


Fig 2. Position after White's 28th move

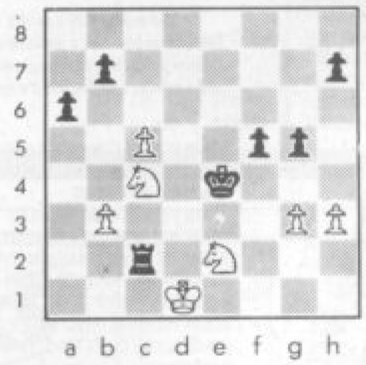


Fig 3. Position after White's 36th move

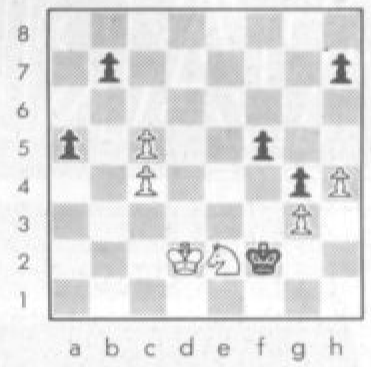


Fig 4. Position after Black's 41st move

Berliner's obvious respect for his electronic opponent may seem excessive but it is justified by the game that follows.

BELLE (White) v H. Berliner (Black — Alekhine's Defense)

1. P-K4, N-KB3; 2. P-K5, N-Q4; 3. P-Q4, P-Q3; 4. N-KB3, P-KN3; 5. P-QB4, N-N3; 6. PxP, BPxP; 7. B-K2, B-N2; 8. O-O, O-O; 9. B-K3, N-QB3; 10. N-QB3,

Up to here BELLE was "in the book". 10. . . . P-Q4! 11. P-B5, N-B5; 12. BxN, PxB; 13. Q-K2, B-KN5! Threatening to take the Queen Pawn. 14. QR-Q1, NxP; 15. BxN; BxB;

16. RxB? Berliner considers this a subtle mistake. Apparently White wins two Knights for only Rook and Pawn. However, the variation favours Black who obtains much better-placed pieces in the following end game. 16. . . . QxR; 17. NxQ, BxQ; 18. N(Q4) x B, KR-Q1! Threatening to penetrate to the seventh rank. BELLE now defends well. (If for example, 19. R-Q1, RxRch; 20. NxR, R-QB1; wins a Pawn.) 19. P-QN3, PxP; 20. PxP, R-Q7; 21. P-KB4!

A good move which prevents Black chasing away White's Knight with a Pawn when it reaches the good defensive square of Q4.

21. . . . R-QN7; 22. N-Q4, R-Q1; 23. N-R4, R-Q7; 24. N-QN5, P-QR3; 25. N(5)-B3, R-QB7; 26. R-Q1, R(1)-Q7; 27. RxR, RxR; 28. P-KN3,

White is badly restricted. It was necessary to defend the King's Bishop's Pawn to avoid threats such as R-Q5 and R-QN5. Berliner now restricts the Knights even further.

28. . . . P-KB4; 29. P-R3, K-B2; 30. K-B1, P-K4; A temporary Pawn sacrifice aimed at getting his King into play. However, the King and Rook now become vulnerable to Knight forks.

Berliner comments: "I had done my calculations and everything seemed to be in order. But against a program that was by now probably looking at least nine ply deep, one mistake could prove fatal."

31. PxP, K-K3; 32. N-N6, R-B7; (If 32 . . . KxP?; 33. N-B4ch wins the Rook.) 33. N-K2, KxP; 34. K-K1, K-K5; menacing, but also placing the King in a dangerously exposed position. 35. N-QB4, P-KN4; 36. K-Q1,

36. . . . RxN (B5)! 37. PxR, K-Q6; More bold play by Berliner. He is now a Pawn for a Knight behind in material, but has a passed Pawn on the Queen side,.a potential one on the King side and a strong King position.

He comments, "Black has excellent winning chances." Of course, this largely depends on the player's ability. Against a lesser opponent than Berliner, BELLE might well go on to draw or even win.

38. N-KN1, P-N5; 39. P-R4, K-K6; 40. N-K2, K-B7; 41. K-Q2, P-QR4;

Only now does a Black victory begin to seem likely to the untrained eye. Even so there are many difficult variations to consider, which space prevents me from including here. White's best chance now was probably 42. N-Q4. However, BELLE continued: 42. K-Q3, P-R5; 43. N-Q4, P-R6; 44. K-B2, P-R7; 45. K-N2, P-KB5! 46. N-B5, PxP; 47. Resigns.

BY MAX BRAMER

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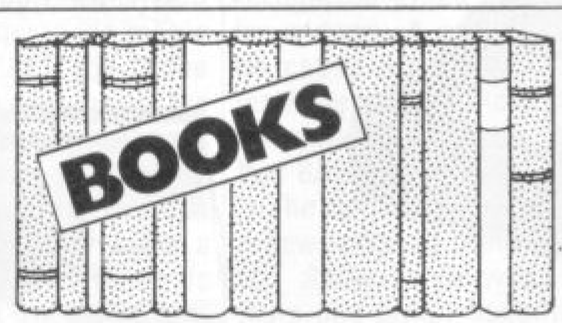
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The Wife's Tale

BY SUE GARDEN



ILLUSTRATION: TERRY ROGERS

I see the grass has grown, I said. "Maybe I could INST DEL it", he replied. With a phasar operated lawn mower I suppose.

"Disaster! I have been foully slain by a wicked warlock!"

"I've torpedoed the sixth Klingon. Now I must find a Starbase. Heading 60 degrees warp factor eight."

Such are the remarks that hurtle through our house, as husband, children, husband's friends, children's friends cluster around the 1980s equivalent of the old joanna.

No more do the tinkling ivories herald a burst of "Love's Old Sweet Song", nor even a lusty chorus of "Roll Out the Barrel". These days the keys are pressed to cries of "Poke the Ram", (the modern version of 'Pin the Tail on the Donkey'), "Get G String" (nothing to do with strip poker) or, more enigmatically, F2 OD OC...

The computer, it seems, is the latest in man's compendium of hobbies to lure him from the real world. "At least," declares my golfing widow friend, "your husband does not disappear for hours on end every weekend. You know where he is."

Physically, I cannot deny, there is a figure hunched intently in a corner of the room. The cups of coffee, carefully positioned, are retrieved, empty, after a lapse of time. At mealtimes, the figure is there — well, eventually — and gives every appearance of eating according to convention.

Conversationally, it is another question. Casual remarks are met with a dreamy, vacant look and bizarre rejoinder.

"More mince, dear?" I ask. "I saved 500 bytes." comes the reply. At what cost to the digestion, one wonders?

"The sink is still blocked." "... then it might crash" Surely it cannot be that serious?

"I see the grass has grown again." "I could Inst Del it." With a phasar-operated lawn-mower, I presume.

How insignificant the minutiae of everyday life must appear, to one who has just been ruling the world! Before that, he saved the known universe from extinction by an alien force, then traded intergalactically in medical supplies and machinery. Why is the magic not the same in a trip to the chemist for soda, or to the hardware shop for a spare part for the lawn-mower?

I was engaged in conversation recently with a plumber who had come to mend a leak in the water-tank. ("A drip? Good grief, woman, famine has just wiped out two-thirds of the population.") Spying the computer, he expounded on its mysterious allure. The aggression of most games appeals to man's violent nature. He can sublimate, electronically, instead of beating the wife. They don't make plumbers like they used to.

Had I realised that my house could be run by computer, he enquired. It would put on the heating, the oven, the electric blanket. Do the shopping, cook the meal, wash the shirts, scrub the floors? My interest was roused. Well, no, not yet, they were working on it.

As the programmers tend to be men, obviously they go first for the tiresome jobs around the house (i.e. putting on switches), leaving the smaller tasks to a later stage of development.

In the States, there is a recognised breed of computer widows. A computer can be cause for divorce. Neglect? Desertion? Adultery? I have had my doubts about that BASEX tape.

The bookcase groans with a new range of reading matter. *Software Secrets,* murmurs one tome, beguilingly. *1001 Things to do with your Personal Computer* volunteers another. Odd that it does not mention the half a dozen which spring instantly to mind.

"If you can't beat them, join them", says the old piece of advice. Imagine the scenes of violence if we were both jostling for the eight-hour slot on a Saturday.

Anyway, dinner is ready. "Won't be a moment. I'll just program it to play itself at chess while we eat." Well, that's fun for it! Imagine the surge of triumph in its steely breast when it wins.

Come to think of it, I wonder whether the cunning beast is gradually eliminating the human element altogether. It sorted out the world, all by itself, for four hours the other evening. End of human life in 2030. It was fed with more information. We watched, helplessly, for another four hours. End of human life in 2030.

My football widow neighbour knocks on the door. "Fancy a trip into town?"

"Well I would, but I shall have to make tea in a minute." The soulless tones of "So long, it's been good to know you" come clanging into the kitchen. "That means the SS Enterprise has collided with a star. I must put the kettle on quickly, before he boldly goes anywhere else."

She looks baffled. What a simple life she leads! She knows her husband is running round a muddy field, in bitter cold and shorts, chasing a piece of leather.

Mine, on the other hand, he's zapped five alien spaceships and failed, on a slight navigational error, to repel a galactic invasion.

It makes you sort of proud doesn't it?

The 3-D space fortress

ZAXXON



The deep blue fortress of Zaxxon floats in space at the frontier of a third dimension in arcade games.

It is heavily armoured with missiles, cannons and forcefields and your mission is to fly through its defences to destroy the deadly robot and its homing missile.

Over the wall and the enemy fortress is mapped out in marvellous detail before you. One hand on the joystick and the other on the fire button you can see the ranks of missiles, the green cannons and red fuel tanks. Planes are waiting on the runways beneath and these can be strafed for extra points while blown-up fuel tanks provide extra fuel as you fly deeper into the fortress.

The control stick allows you to bank left and right and change altitude. You can judge your height by the size of the player ship, which appears larger or smaller, depending on altitude. And there is also a shadow which follows its every move.

Altitude is critical when you fly through the tiny gaps between the walls and the electronic barrier. If you survive the enemy barrage in the fortress, you next have to take on the enemy fleet.

It's made more realistic as you have to be at the correct altitude to score a hit on the enemy planes. Once through the dogfight, you are involved in a new battle at the enemy headquarters. This is a better defended fortress with tighter passages and increasingly heavy firepower.

The climax of Zaxxon is the battle with the armoured robot and its homing missile. Here six hits are needed before the missile and robot are vanquished.

NOT TO BE MISSED

TIPS ON MISSILE COMMAND

Missile Command was the first arcade game to introduce a semblance of realism to video warfare.

Based around an anti-ballistic missile (A.B.M.) conflict over a number of cities, which have to be protected from bombardment, it recreates some of the horrors of a nuclear war.

It also offers such a rush of action that it can be confusing for the casual watcher. The first thing the beginner must learn is not to aim his missile sight (a cross on the screen which guides the warheads) directly on the descending missiles. This is because missiles have to be fired from ground to air and in the split second that takes, the enemy warhead will have already passed through the area of explosion.

Instead, fire just below the oncoming missiles and they will be detonated by entering the area of explosion. Also remember that missiles from your centre base travel faster — and so are more useful — than those from the right and left bases.

The most important tactic is the scatter. Done right at the beginning of the screen when missiles are first coming down, a good scatter will halt the deadly rain of missiles, hold-up the "smart" bombs and destroy the first satellite. Use the right or left base to scatter a chain of cross marks two-thirds of the way up the screen.

This will produce a curtain of explosions which takes the initial sting out of the enemy attack.

Leave one or two missiles in the base used to scatter, as these must be saved for the satellites which come out from either edge of the screen.

Satellites must be hit before they reach the middle of the screen or they will onload a further deadly rain of missiles.

Save the centre base's missiles for warheads which have penetrated your first lines of cover. These are also useful when you have reached a score over a million. Then 14 or more smart bombs can appear on the screen. Smart bombs will hover over explosions and then continue their descent when they feel it is safe. These can only be destroyed by a direct hit, usually from the faster centre base.

On most machines, bonus cities are awarded every 10,000 points and a maximum of three can be destroyed on any one screen. If one city is left, a good strategy is to finish the screen just under your next bonus score, say 49,000. This means that in the next screen you will only need to score a 1,000 to earn your next bonus city.

Simon Lord from Nottingham, who provided us with these tips and has a high score of over 12 million in eight hours, also pointed out a common bug on the Missile Command game. When a score of 800,000 points is reached, many machines award over 80 bonus cities — this is the time to go to the loo.

THE GAME WITH MORE ZIP

PEPPER II

For a game with a little more "zip" to it, try the new Pepper II maze quest.

The main character in Pepper II, is an angel but he is occasionally prone to complete a Dr Jeckyll and Mr Hyde transformation into a devil.

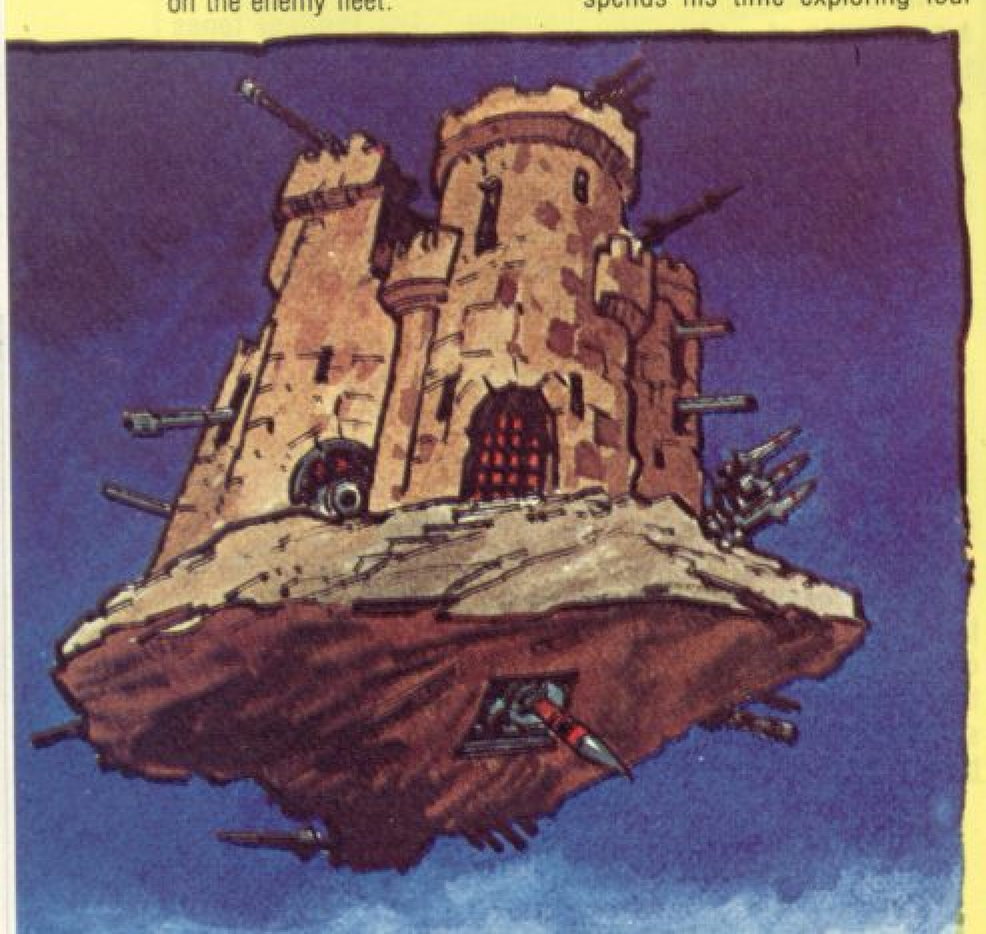
Pepper is his name and he spends his time exploring four sections of the screen, searching for secret areas. As he travels he leaves a zipper-like track behind him. As in the game Qix, once a complete area has been surrounded by these tracks, it is filled by a brightly coloured pattern and points are awarded.

As he roams around the screen, Pepper must take care to avoid the two villains of the piece, the roaming eyes and the deadly whippersnapper.

The whippersnapper is a bright crimson enemy who will unzip any of Pepper's tracks which do not fully enclose an area. When Pepper manages to surround an area which contains a pitchfork, he turns into a devil for a few seconds (reminiscent of Pacman).

While in his Mr Hyde form he can capture the roaming eyes for extra points but still cannot bring the whippersnapper to heal.

As in Pacman, Pepper II just has the one control, a joystick, which adds to the playability but does not detract from the excitement.



ACTION

NO SITTING ON THE DOCK OF THIS BAY

PORTMAN

There's no time to sit back and take a tea-break in the dockyards of the game Portman.

In this visual game, you take the part of an overworked docker charged with the task of loading a ship which is just about to leave dock.

But you can't expect life to be too easy in arcade games and the Portman docks are plagued by a team of saboteurs who are out to disrupt the work as much as possible.

The ship's captain is also determined to make things difficult and he keeps his ship chugging backwards and forwards at the dock. The cargo is stored at the top of the screen and drops randomly earthwards. Your docker must chase after descending cargo and catch it — some pieces of cargo can only be caught on the first bounce.

Trucks also travel the quayside and if an item of cargo hits the truck it will cause it to stay in the same position for a few seconds obstructing your freedom of movement on the dock.

Once all the cargo is successfully loaded onto the boat between four pillars, the game moves into its second phase. In this, conveyor belts travel across the screen loaded with boxes of dynamite. The saboteurs use the conveyor belts to try and kick the boxes down onto the quayside before you are ready to catch them.

You are armed with stones which you can hurl at the saboteurs and throw up to dislodge boxes of dynamite when you feel ready to catch them. If you miss a box, it will blow away a section of the floor and soon make the dockyard disintegrate.

Once through this section of the game, you are returned to the first phase, except that it becomes increasingly difficult as the game goes on.

Three lives to play with but the union really ought to do something about the working conditions.

A CUTE AQUATIC FAIRY TALE

DEVIL FISH

An aquatic maze made up of geometric seaweed and coral reef is the setting for Devil Fish.

The story behind the game reads like the wettest fairy tale:

Deep in the sea garden there was once a happy group of aquatic creatures. But one day a school of fierce Devil Fish broke out of their prison and occupied the sea garden.

The angry King of the Sea appointed the brave Sea Dog to conquer the Devil Fish and make the sea garden a happy place again where honest aquatic creatures could swim in safety . . .

This scenario places Devil Fish firmly in arcade games "cute" category but it still offers a good twist to the familiar Pacman theme.

The strange sea mazes are made up of regular width passages but with nodules on their



sides which restrict the size of creature which can pass through them.

The Sea Dog of the saga is represented on the screen by a fishy face and the Devil Fish are small blue octopus-like creatures. These grow progressively larger as the Sea Dog feeds them up with bait. Eventually they get too large to pass by certain of the passage nodules, and when they are stuck, Sea Dog goes back and attacks them.

When he successfully disposes of the first batch of Devil Fish a more complicated maze features on the screen as the game gets progressively harder.

IS IT A PINTABLE?



Look, up there in the arcade. Is it a pinball or is it a video machine? No . . . it's a mixture of both!

Bally's latest mechanical fantasy includes features seen on both the screens and playfields at your local arcade.

Like pinball it features drop targets and bonus scores. Like video games it employs laser blasters, alien creatures and trusty force field.

Rapid Fire — that's the name Bally have given to this hybrid creation — comes in a pinball style cabinet and has a pinball style L.E.D. scoreboard. But there the similarity to a regular pintable vanishes.

The first thing the player will notice when he steps up to the machine are the two pistol-like grips — which control the action — at the front of the machine. With these you fire the projectiles and defend yourself with the force field button.

The grips direct the angle of fire from the four inch "gun" barrel at the base of the machine. Out of this barrel hurtle the small metal balls which the player has to aim at targets at the back of the playfield.

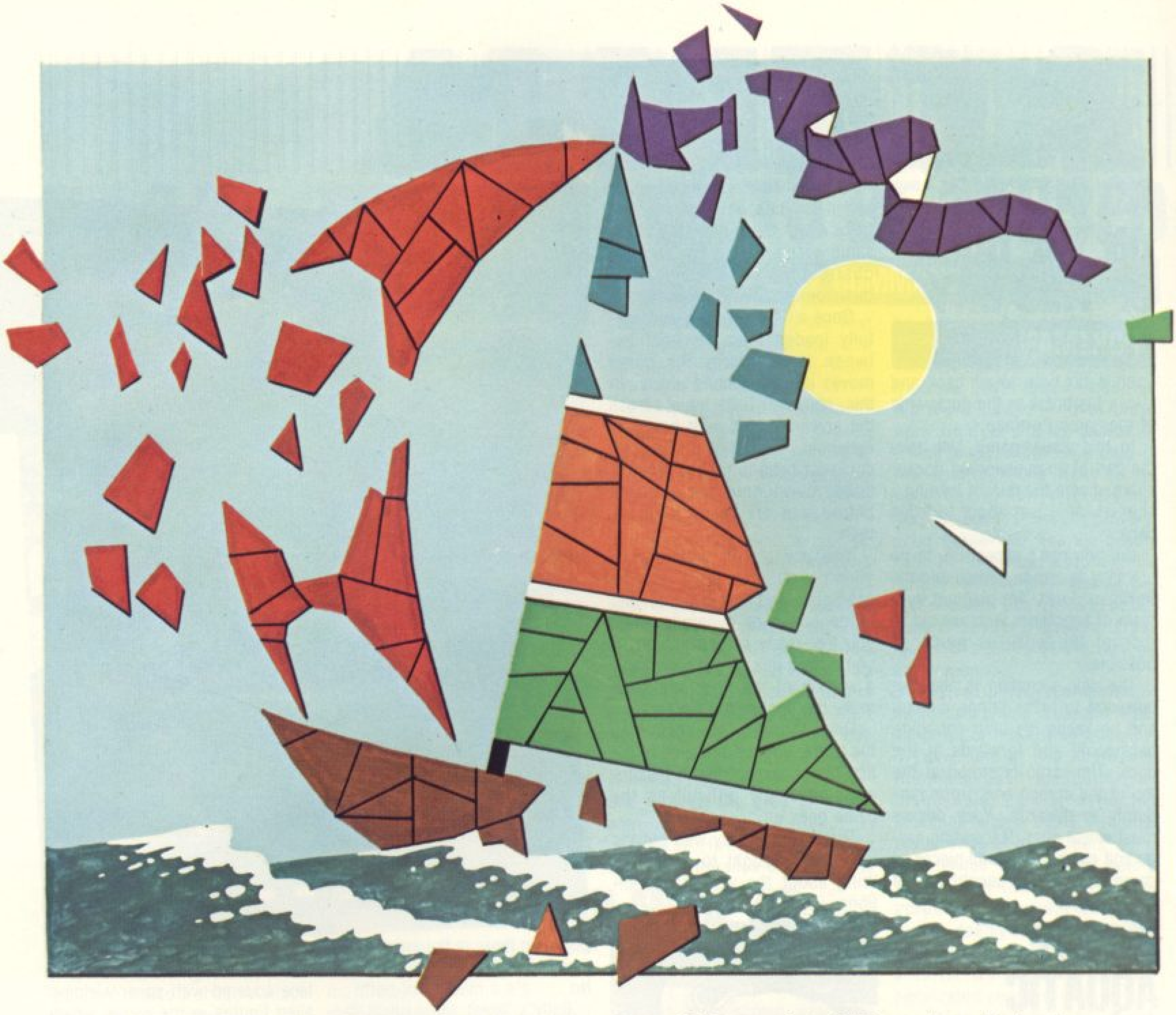
The playfield itself is a flat surface covered with spear-wielding alien figures in the centre which light up as the game progresses. Down each side are ranged space tanks — ready to blast the unwary player.

The aim of the game is to hit the drop targets so that letters spelling out the word F-R-E-N-Z-Y are lit up. This puts the machine into rapid fire mode — and you can blast away at the space tanks and aliens at a rate of 480 balls per minute!

The aliens send out blasts of fire which you have to fend off using your force field.

Also featured on the machine are a laser blaster button which you can use to help boost your score — and in real moments of stress when everything seems to be firing at you at once you can hit the panic button which brings about your salvation. But you can only use it a limited number of times.

Rapid Fire may not be a favourite with serious pinball players but it certainly offers a new challenge to all arcade addicts everywhere.



This program is based on those plastic puzzles which consist of 15 numbered plastic tiles which have to be arranged in ascending order of value. In the program the numbers are replaced by shapes which when positioned in correct order make a picture of a sail boat. This picture is displayed at the start of the program before the computer scrambles it.

Your task is to unscramble the bits and complete the picture in as few moves as possible. To do this you move pieces into the space marked with a cross.

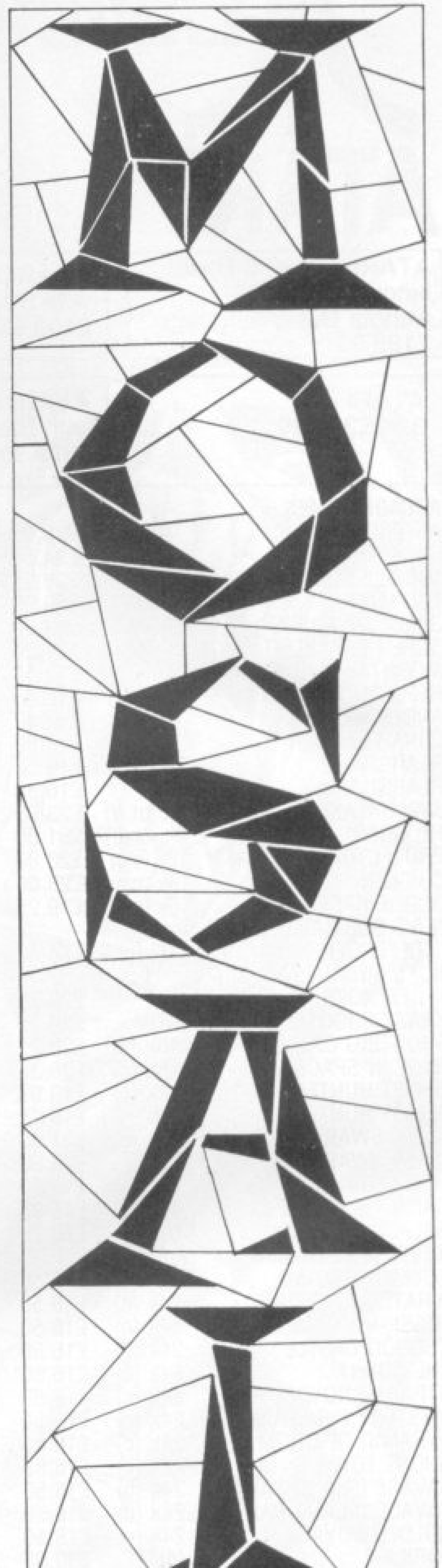
If the section you want to move is above the space you must press M — the down key. Other keys used are U-up, H-left and K-right. There are five skill levels to the game. After you have become familiar with the method of moving the pieces you should be able to advance to higher levels which scramble the picture even more.

RUNS ON A SHARP MZ-80K

BY JOSEPH HEWITSON

```
10 REM ***** MOSAIC *****
20 REM
30 REM  By Joseph Hewitson
40 REM
50 REM For the SHARP MZ-80K
60 REM
70 REM
100 DIMA$(17),A(16),B(16,4),C(16),D(16),E(16)
110 FORLOOP=1TO16:READA$(LOOP),A(LOOP)
115 FORRING=1TOA(LOOP):READB(LOOP,RING):NEXT:READD(LOOP),E(LOOP):NEXT
120 DATA "[graphic characters]",2,2,5,4,4
130 DATA "[graphic characters]",3,1,3,6,4,8
140 DATA "[graphic characters]",3,2,4,7,4,12
150 DATA "[graphic characters]",2,3,8,4,16
160 DATA "[graphic characters]",3,1,6,9,8,4
170 DATA "[graphic characters]",4,2,5,7,10,8,8
180 DATA "[graphic characters]",4,3,6,8,11,8,12
190 DATA "[graphic characters]",3,4,7,12,8,16
200 DATA "[graphic characters]",3,5,10,13,12,4
210 DATA "[graphic characters]",4,6,9,11,14,12,8
220 DATA "[graphic characters]",4,7,10,12,15,12,12
230 DATA "[graphic characters]",3,8,11,16,12,16
290 DATA "[graphic characters]",2,9,14,15,4
```

```
300 DATA "▒▒▒▯▯▯▯▯▒▒▒▯▯▯▯▯~~▯▯▯▯▯~~",3,10,13,15,16,8
310 DATA "▒▒▒▯▯▯▯▯▒▒▒▯▯▯▯▯~~▯▯▯▯▯~~",3,11,14,16,16,12
320 DATA "▒~~▯▯▯▯▯~~▯▯▯▯▯~~▯▯▯▯▯~~",2,12,15,16,16
325 PRINT"▯"
330 FORLOOP=6TO41:SETLOOP,6:NEXT
340 FORLOOP=6TO41:SET41,LOOP:NEXT
350 FORLOOP=41TO6STEP-1:SETLOOP,41:NEXT
360 FORLOOP=41TO6STEP-1:SET6,LOOP:NEXT
370 FORLOOP=1TO16:POKE4466,D(LOOP):PRINTTAB(E(LOOP));A$(LOOP):NEXT
380 PRINT"▯";:PRINTTAB(24);"▯▯▯▯▯▯A life on the "
390 PRINTTAB(26);"ocean wave!"
400 PRINTTAB(24);"▯A home on the"
410 PRINTTAB(26);"rolling sea!"
420 PRINTTAB(24);"▯Where the "
430 PRINTTAB(26);"scattered"
440 PRINTTAB(26);"waters rave,"
450 PRINTTAB(26);"▯And the wind"
460 PRINTTAB(26);"their revels"
470 PRINTTAB(26);"keep."
480 GOSUB3000
490 FORLOOP=1TO1000:NEXT
510 FORLOOP=6TO18:POKE4466,LOOP:PRINTTAB(24);"                ":NEXT
530 PRINT"▯";:PRINTTAB(25);"▯▯▯▯▯INSTRUCTIONS"
540 PRINTTAB(24);"▯I will scramble"
550 PRINTTAB(26);"this picture."
560 PRINTTAB(24);"▯Then you have"
570 PRINTTAB(26);"to unscramble"
580 PRINTTAB(26);"it!"
590 PRINTTAB(24);"▯To do this you"
600 PRINTTAB(26);"have to move"
610 PRINTTAB(26);"pieces into"
620 PRINTTAB(26);"the space,"
630 PRINTTAB(26);"marked '^'."
640 FORLOOP=1TO5000:NEXT
650 FORLOOP=5TO18:POKE4466,LOOP:PRINTTAB(24);"                ":NEXT
660 PRINT"▯";:PRINTTAB(24);"▯▯▯▯▯▯To move a"
670 PRINTTAB(26);"piece into the"
680 PRINTTAB(26);"▯space, key in"
690 PRINTTAB(26);"the direct-"
700 PRINTTAB(26);"ion you wish"
710 PRINTTAB(26);"the piece to"
720 PRINTTAB(26);"move."
730 PRINTTAB(24);"▯U - UP"
740 PRINTTAB(24);"H - LEFT"
750 PRINTTAB(24);"K - RIGHT"
760 PRINTTAB(24);"M - DOWN"
770 FORLOOP=1TO5000:NEXT
780 FORLOOP=6TO17:POKE4466,LOOP:PRINTTAB(24);"                ":NEXT
790 REM *** SKILL SELECTION ***
800 PRINT"▯";:PRINTTAB(24);"▯▯▯▯▯▯SKILL LEVEL"
810 PRINTTAB(24);"▯1: Beginner"
820 PRINTTAB(24);"▯2: Improver"
830 PRINTTAB(24);"▯3: Apprentice"
840 PRINTTAB(24);"▯4: Expert"
850 PRINTTAB(24);"▯5: Whizz-kid"
860 SWAPS=0:GETIN$:IFIN$=""THEN860
870 IFIN$="1"THENSWAPS=3
880 IFIN$="2"THENSWAPS=10
890 IFIN$="3"THENSWAPS=17
900 IFIN$="4"THENSWAPS=21
910 IFIN$="5"THENSWAPS=97
920 IFSWAPS=0THEN860
930 LEVEL=VAL(IN$)
940 FORLOOP=3TO20:POKE4466,LOOP:PRINTTAB(24);"                ":NEXT:USR(62)
1000 REM *** SHUFFLE ***
1010 FORLOOP=1TO16:C(LOOP)=LOOP:NEXT
1020 SPACE=8:MOVE=0
1030 FOR LOOP = 1TO SWAPS
1040 CHANGE=INT(RND(1)*A(SPACE))+1
1050 A1=B(SPACE,CHANGE):A2=C(A1):C(A1)=C(SPACE):C(SPACE)=A2:SPACE=A1:NEXT
1060 A$(8)="  ▯▯▯▯▯ \/ ▯▯▯▯▯ /\ ▯▯▯▯▯  "
1070 FORLOOP=1TO16:POKE4466,D(LOOP):POKE4465,E(LOOP):PRINTA$(C(LOOP)):NEXT
2000 GETIN$:IFIN$=""THEN2000
2010 IFIN$="U"THENOTHER=SPACE+4
2020 IFIN$="H"THENOTHER=SPACE+1:IF(OTHER=5)+(OTHER=9)+(OTHER=13)THEN2000
2030 IFIN$="K"THENOTHER=SPACE-1:IF(OTHER=4)+(OTHER=8)+(OTHER=12)THEN2000
2040 IFIN$="M"THENOTHER=SPACE-4
2050 IF(OTHER<1)+(OTHER>16)THEN2000
2060 A1=C(OTHER)
2070 C(OTHER)=C(SPACE):C(SPACE)=A1:A2=SPACE:SPACE=OTHER:OTHER=A2
2080 POKE4466,D(SPACE):PRINTTAB(E(SPACE));A$(C(SPACE))
2090 POKE4466,D(OTHER):PRINTTAB(E(OTHER));A$(C(OTHER)):MOVE=MOVE+1
2180 RIGHT=0:FORLOOP=1TO16:IFC(LOOP)=LOOPTHENRIGHT=RIGHT+1
2190 NEXT
2200 IFRIGHT<16THEN2000
2210 FORLOOP=1TO3
2220 MUSIC"_C8_D_E_F_G_A_BCDEFGAB¯C¯D¯E¯F¯G¯A¯B":NEXT
2230 PRINT"▯▯▯▯▯"
2240 PRINTTAB(24);"On Level";LEVEL;"."
2250 PRINTTAB(24);"▯You took";MOVE
2260 PRINTTAB(24);"▯moves."
2270 GOSUB3000
2280 PRINTTAB(24);"▯▯▯▯▯▯Try Again (Y/N)"
2290 GETIN$:IFIN$=""THEN2290
2300 IFIN$="N"THENPRINT"▯";:END
2310 IFIN$="Y"THEN2330
2320 GOTO2290
2330 FORLOOP=5TO16:POKE4466,LOOP:PRINTTAB(24);"                ":NEXT:GOTO790
3000 TEMPO6:MUSIC"D3R0D3R0G3R0G3R0G5R0G1R0B6R5G1R0B3R0B3R0B3R0¯C5R0B1R0A6R4"
3010 MUSIC"A3R0F3R0D5R0F3R0A5R0B3R0¯C6R4"
3020 MUSIC"¯C3R0¯D3R0¯E5R0¯D3R0¯C3R0B3R0A3R0G5"
3030 RETURN
```



HAUNTED HOUSE

Listen to the children of the night — how sweet they sound. Their howls and moans echo through the gloomy corridors of the Haunted House. Once within the rambling edifice you will be confronted by many unknown horrors.

There are several rooms to explore and dangers to cope with — but you must escape. Otherwise you could be joining the inhabitants of this gothic mansion before long!

Once the door locks behind you there is only one way out — but telling you more would spoil our macabre entertainment. Useful words to use are; Go, Take, Leave, Use, Exorcise, North, South, East, West, Up, Down.

Statements 10-600 set up the arrays describing the rooms and their contents. 600-700 ties the subroutines together. 1000 handles the keyboard entry. 2000 lists what you are carrying. 3000 decodes verbs and generates the associated messages.

The author reckons the strength of his program lies in its flexibility. Any room names, object names and room contents can be changed simply by altering the statements assigning the string contents. The vocabulary will alter accordingly. The interaction between the room contents can similarly be altered and does not depend on the names contained in the arrays. Thus the body of the program can handle any number of rooms, with any interconnection, without alteration.

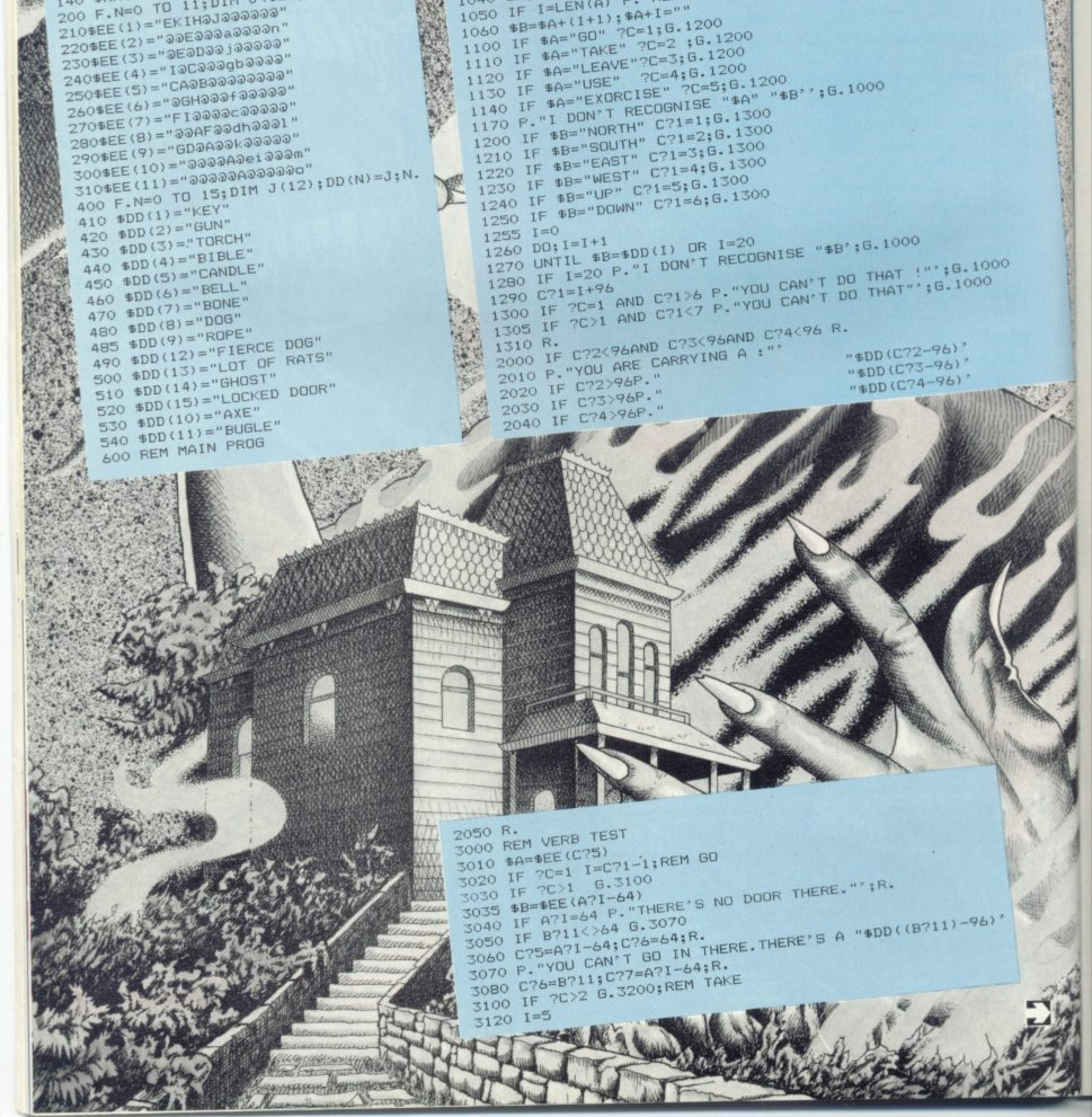


Illustration by Stuart Briers

RUNS ON AN ACORN ATOM IN 12K

BY ALEC PEARSON

```
10 REM HAUNTED HOUSE
15A=#8200;B=A+64;C=B+64
20 DIM RR(11),EE(11),DD(20)
30 F.N=0 TO 11;DIM J(14);RR(N)=J;N.
40 $RR(1)="HALL"
50 $RR(2)="LOUNGE"
60 $RR(3)="DINING ROOM"
70 $RR(4)="KITCHEN"
80 $RR(5)="BALLROOM"
90 $RR(6)="CONSERVATORY"
100 $RR(7)="BILLIARD ROOM"
110 $RR(8)="LIBRARY"
120 $RR(9)="STUDY"
130 $RR(10)="CELLAR"
140 $RR(11)="GARDEN"
200 F.N=0 TO 11;DIM J(12);EE(N)=J;N.
210$EE(1)="EKIH@J@@@@@@"
220$EE(2)="@@E@@@a@@@@n"
230$EE(3)="@E@D@@j@@@@@"
240$EE(4)="I@C@@@gb@@@@"
250$EE(5)="CA@B@@@@@@@@"
260$EE(6)="@GH@@@f@@@@@"
270$EE(7)="FI@@@@c@@@@@"
280$EE(8)="@@AF@@dh@@@l"
290$EE(9)="GD@A@@k@@@@@"
300$EE(10)="@@@@A@ei@@@m"
310$EE(11)="@@@@@A@@@@@o"
400 F.N=0 TO 15;DIM J(12);DD(N)=J;N.
410 $DD(1)="KEY"
420 $DD(2)="GUN"
430 $DD(3)="TORCH"
440 $DD(4)="BIBLE"
450 $DD(5)="CANDLE"
460 $DD(6)="BELL"
470 $DD(7)="BONE"
480 $DD(8)="DOG"
485 $DD(9)="ROPE"
490 $DD(12)="FIERCE DOG"
500 $DD(13)="LOT OF RATS"
510 $DD(14)="GHOST"
520 $DD(15)="LOCKED DOOR"
530 $DD(10)="AXE"
540 $DD(11)="BUGLE"
600 REM MAIN PROG
610 F.N=0 TO 64;C?N=0;A?N=0;B?N=0;N.;I=0;P.$12
620C?5=1;P."YOU HAVE JUST ENTERED A HAUNTED HOUSE AND THE "
625 P."DOOR HAS LOCKED   BEHIND YOU."''
626 P."        CAN YOU ESCAPE!!"''
630 P."WE ARE IN THE "$RR(C?5)'
633 IF C?5=11 END
635 GOS. 4000
640 GOS.2000
650 P."WHAT NOW?"';GOS.1000
660 GOS.3000;REM TEST VERB
662 IF C?5=11 P."!!!!YOU MADE IT!!!"';G.630
665 IF ?C=1 G.630
670 G.650
1000 REM INPUT CMDS
1010 IN.$A
1020 I=0;IF LEN(A)<1 G.1000
1030 DO;I=I+1
1040 UNTIL A?I=32 OR I=LEN(A)
1050 IF I=LEN(A) P."REPLY TWO WORDS"';G.1000
1060 $B=$A+(I+1);$A+I=""
1100 IF $A="GO" ?C=1;G.1200
1110 IF $A="TAKE" ?C=2 ;G.1200
1120 IF $A="LEAVE"?C=3;G.1200
1130 IF $A="USE"  ?C=4;G.1200
1140 IF $A="EXORCISE" ?C=5;G.1200
1170 P."I DON'T RECOGNISE "$A" "$B'';G.1000
1200 IF $B="NORTH" C?1=1;G.1300
1210 IF $B="SOUTH" C?1=2;G.1300
1220 IF $B="EAST" C?1=3;G.1300
1230 IF $B="WEST" C?1=4;G.1300
1240 IF $B="UP" C?1=5;G.1300
1250 IF $B="DOWN" C?1=6;G.1300
1255 I=0
1260 DO;I=I+1
1270 UNTIL $B=$DD(I) OR I=20
1280 IF I=20 P."I DON'T RECOGNISE "$B';G.1000
1290 C?1=I+96
1300 IF ?C=1 AND C?1>6 P."YOU CAN'T DO THAT !"';G.1000
1305 IF ?C>1 AND C?1<7 P."YOU CAN'T DO THAT"';G.1000
1310 R.
2000 IF C?2<96AND C?3<96AND C?4<96 R.
2010 P."YOU ARE CARRYING A :"'
2020 IF C?2>96P."                    "$DD(C?2-96)'
2030 IF C?3>96P."                    "$DD(C?3-96)'
2040 IF C?4>96P."                    "$DD(C?4-96)'
2050 R.
3000 REM VERB TEST
3010 $A=$EE(C?5)
3020 IF ?C=1 I=C?1-1;REM GO
3030 IF ?C>1  G.3100
3035 $B=$EE(A?I-64)
3040 IF A?I=64 P."THERE'S NO DOOR THERE."';R.
3050 IF B?11<>64 G.3070
3060 C?5=A?I-64;C?6=64;R.
3070 P."YOU CAN'T GO IN THERE.THERE'S A "$DD((B?11)-96)'
3080 C?6=B?11;C?7=A?I-64;R.
3100 IF ?C>2 G.3200;REM TAKE
3120 I=5
```



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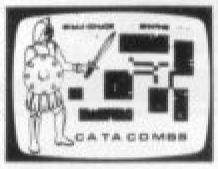


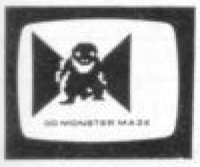
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Generates simple addition and subtracton problems for the young user. Uses giant numbers on the screen and rewards correct answers with a colourful display. **£6.95**

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Stock Portfolio Manager
8k expansion required. Tracks last 6 values of each stock and plots trend curves on screen. Provides complete analysis of your portfolio including number owned, purchase date, cost, value, appreciation, yield, etc. **£14.95**

Moon Lander
This game allows the 'Astronaut' to take over the controls of a Lunar Excursion Module as it is making its descent to the moon. The program provides information via screen displays depicting amount of propulsion, fuel remaining, height and descent speed. In addition the LEM is displayed as it descends to the surface. If the astronaut is not careful, the module can be damaged or even totally destroyed upon impact. **£5.95**

Wrap
This is a two player game requiring manual skill and dexterity as you attempt to trap your opponent and force him to 'Crash'. The VIC will act as your opponent if you desire. **£6.95**

Bricks
This game requires skill as you attempt to knock out the various coloured bricks without missing the returning ball. The deeper you succeed in breaking into the wall the higher the value of your score until you break through and truly increase your score. See who can get the highest score. Joystick version. **£4.95**

Blackjack
Las Vegas style blackjack with the VIC serving as dealer. Two players can play against the house (VIC) utilizing such strategy as 'Doubling Down' and controlling your bets. Each card is displayed on the screen in full colour. The VIC provides an easy way to develop your 'SYSTEM' before actually going to the tables. **£5.95**

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The standard game of Paddle tennis with the option of the VIC playing one or both sides of the net. Excellent use of the colour and sound capabilities of the VIC. **£5.95**

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Try your hand at this 'One Armed Bandit'. See the wheels spin and the handle pull utilizing the VIC's colour and sound capabilities. You can really get arm weary pumping in your money. **£4.95**

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The Aliens are invading the Earth and it is up to you to destroy them before they land. The tension increases as you try to accumulate a high score. Joystick version. **£6.95**

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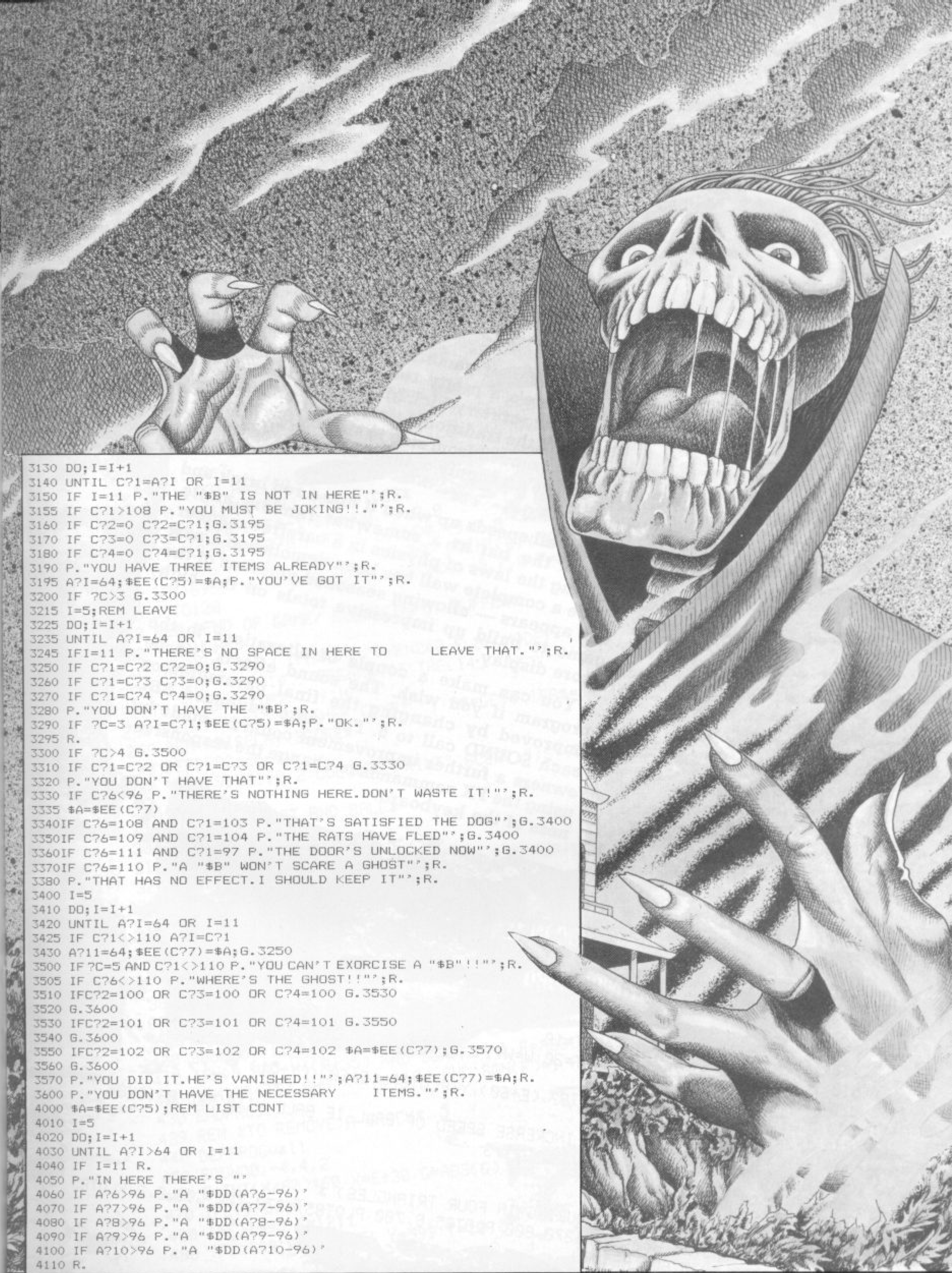
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```
3130 DO;I=I+1
3140 UNTIL C?1=A?I OR I=11
3150 IF I=11 P."THE "$B" IS NOT IN HERE"';R.
3155 IF C?1>108 P."YOU MUST BE JOKING!!."';R.
3160 IF C?2=0 C?2=C?1;G.3195
3170 IF C?3=0 C?3=C?1;G.3195
3180 IF C?4=0 C?4=C?1;G.3195
3190 P."YOU HAVE THREE ITEMS ALREADY"';R.
3195 A?I=64;$EE(C?5)=$A;P."YOU'VE GOT IT"';R.
3200 IF ?C>3 G.3300
3215 I=5;REM LEAVE
3225 DO;I=I+1
3235 UNTIL A?I=64 OR I=11
3245 IFI=11 P."THERE'S NO SPACE IN HERE TO      LEAVE THAT."';R.
3250 IF C?1=C?2 C?2=0;G.3290
3260 IF C?1=C?3 C?3=0;G.3290
3270 IF C?1=C?4 C?4=0;G.3290
3280 P."YOU DON'T HAVE THE "$B';R.
3290 IF ?C=3 A?I=C?1;$EE(C?5)=$A;P."OK."';R.
3295 R.
3300 IF ?C>4 G.3500
3310 IF C?1=C?2 OR C?1=C?3 OR C?1=C?4 G.3330
3320 P."YOU DON'T HAVE THAT"';R.
3330 IF C?6<96 P."THERE'S NOTHING HERE.DON'T WASTE IT!"';R.
3335 $A=$EE(C?7)
3340IF C?6=108 AND C?1=103 P."THAT'S SATISFIED THE DOG"';G.3400
3350IF C?6=109 AND C?1=104 P."THE RATS HAVE FLED"';G.3400
3360IF C?6=111 AND C?1=97 P."THE DOOR'S UNLOCKED NOW"';G.3400
3370IF C?6=110 P."A "$B" WON'T SCARE A GHOST"';R.
3380 P."THAT HAS NO EFFECT.I SHOULD KEEP IT"';R.
3400 I=5
3410 DO;I=I+1
3420 UNTIL A?I=64 OR I=11
3425 IF C?1<>110 A?I=C?1
3430 A?11=64;$EE(C?7)=$A;G.3250
3500 IF ?C=5 AND C?1<>110 P."YOU CAN'T EXORCISE A "$B"!!"';R.
3505 IF C?6<>110 P."WHERE'S THE GHOST!!"';R.
3510 IFC?2=100 OR C?3=100 OR C?4=100 G.3530
3520 G.3600
3530 IFC?2=101 OR C?3=101 OR C?4=101 G.3550
3540 G.3600
3550 IFC?2=102 OR C?3=102 OR C?4=102 $A=$EE(C?7);G.3570
3560 G.3600
3570 P."YOU DID IT.HE'S VANISHED!!"';A?11=64;$EE(C?7)=$A;R.
3600 P."YOU DON'T HAVE THE NECESSARY     ITEMS."';R.
4000 $A=$EE(C?5);REM LIST CONT
4010 I=5
4020 DO;I=I+1
4030 UNTIL A?I>64 OR I=11
4040 IF I=11 R.
4050 P."IN HERE THERE'S "'
4060 IF A?6>96 P."A "$DD(A?6-96)'
4070 IF A?7>96 P."A "$DD(A?7-96)'
4080 IF A?8>96 P."A "$DD(A?8-96)'
4090 IF A?9>96 P."A "$DD(A?9-96)'
4100 IF A?10>96 P."A "$DD(A?10-96)'
4110 R.
```

BREAKOUT

Here's a knock-out game for all you BBC micro owners. There's a pretty red and yellow wall at the top of the screen which Mr Hurd invites you to lay waste in the traditional time honoured fashion. Using a bat moved from side to side by the X and Z keys. There's a supply of three balls served by the space bar.

The ball speeds up when it hits a red brick and leaves the bat at a somewhat random angle, defying the laws of physics in a carefree manner. Once a complete wall has been demolished a new one appears — allowing seasoned veterans of the game to build up impressive totals on the high score display.

You can make a couple of alterations to the program if you wish. The sound effects can be improved by changing the final parameter on each SOUND call to 5. For more advanced BBC owners a further improvement could be made by using the FX commands to change the responsiveness of the keyboard.

RUNS ON A BBC IN 12K

BY NICK HURD

```
500 IFY>649 AND Y<701 Y=649:T=10
510 IFY>699 AND Y<751 Y=704:T=20:W=W+1
520 IFY>749 Y=752:T=20:W=W+1
530 MOVEE,Y:MOVEE,(Y+51):PLOT87,(E+60),Y:PLOT87,(E+60),(Y+51)
540 IFZ=1 Y=Y+52:G=G*-1
549 REM *INCREASE SCORE AND INCREASE SPEED OF BALL IF BALL HITS RED BRICKS*
550 S=S+T:N=N+1:IFW=1 F=F*1.3:G=G*1.3
560 PROCscore
570 ENDPROC
579 REM *PLOT WALL (BY COLOURING IN FOUR TRIANGLES) *
580 GCOL0,1:MOVE8,800:MOVE1270,800:PLOT85,8,700:PLOT85,1270,700:GCOL0,2:PLOT85
,8,600:PLOT85,1270,600:RETURN
```

```
10 REM *** BREAKOUT *** NAH ***
20 H=0:Z=1 -
30 MODE7:PRINT'TAB(14);"BREAKOUT"'TAB(14);"--------"'''TAB(14);"CONTROLS"''''
"LEFT","Z"''"RIGHT","X"''"SERVE","SPACE BAR"''''TAB(11);"HIGH SCORE= ";H''''
40 PRINT TAB(4);"PRESS SPACE BAR TO CONTINUE";
50 A$=GET$:IFA$<>" "GOTO50 ELSE B=3
59 REM *SET UP SCREEN*
60CLS:MODE5:COLOUR1:P=-1:Q=-1:S=0:N=0:PROCscore
70 GCOL0,3:MOVE5,5:DRAW1275,5:DRAW1275,901:DRAW5,901:DRAW5,5:GOSUB5
80
79 REM *MAIN LOOP*
80 REPEATX=RND(1000)+15:Y=490:A=520:W=0:L=110
90 MOVEA,65:DRAWA+L,65:A$=GET$:IFA$<>" " THEN90
100 B=B-1:PROCscore
110 F=RND(5)+11:G=RND(5)+11:E=RND(2):IFE=1 F=F*-1
120 PROCbat
130 X=X-F:Y=Y-G:IFN=84 VDU7:GOSUB580:S=S+50:PROCscore:A=520:Y=590:X=RND(1000)+
15:N=0:GOTO110
139 REM *IS BALL ON OR LOWER THAN BAT*
140 IFY<66 AND POINT(X,65)=2 G=G*-1:Y=66:PROCbounce
150 IFY<66 Y=10:X=X-F:PROCbat:UNTILB=0:GOTO230
160 IFA<6 A=7
170 IFA>1160 A=1160
179 REM *BOUNCE BALL OFF SIDES*
180 IFX<8 X=8:F=F*-1:SOUND0,-9,2,0
190 IFX>1270 X=1270:F=F*-1:SOUND0,-9,2,0
200 IFY>598 AND POINT(X,Y)<>0 AND POINT(X,Y)<>3 PROCwall:F=(RND(5)+10)*SGN(F)
210 IFY>896 Y=896:G=G*-1:Z=1:SOUND0,-9,2,0:F=RND(5)+10*SGN(F)
220 GOTO120
229 REM *END OF GAME/ CLEAR INPUT BUFFER*
230 IFS>H H=S
240 A$=INKEY$(0):IFA$<>" "THEN240 ELSE MODE7
250 PRINT''TAB(14);"BREAKOUT"'TAB(14);"--------";'''TAB(7);"YOUR SCORE    ";S
'TAB(7);"HIGH SCORE    ";H'''''''''
260 PRINTTAB(4)"ANOTHER GAME? ";:A$=GET$:IFA$="Y"THEN30 ELSE CLS:END
269 REM *DISPLAY SCORE*
270 DEFPROCscore
280 VDU4:VDU31,0,2:COLOUR1:PRINT" SCORE ";S:VDU31,12,2:PRINT"BALLS=";B:VDU5
290 ENDPROC
299 REM *MOVE BAT AND BALL*
300 DEFPROCbat
310 IFY=10 GOTO330
320 GCOL0,0:MOVE9,65:DRAWA,65:GCOL0,2:DRAWA+L,65:GCOL0,0:DRAW1264,65
330 MOVEP,Q:PLOT69,P,Q
340 MOVEX,Y:PLOT70,X,Y
350 P=X:Q=Y
360 A$=INKEY$(0):IFA$="Z" A=A-45
370 IFA$="X" A=A+45
380 ENDPROC
389 REM *TO MAKE BAT 'ANGLED'*
390 DEFPROCbounce
400 SOUND0,-11,2,0:Z=0
410 IFX>A AND X<(A+35) AND SGN(F)=-1 F=ABS(F)
420 IFX>(A+75) AND X<(A+110) AND SGN(F)=1 F=F*-1
430 ENDPROC
439 REM *TO REMOVE A BRICK*
440 DEFPROCwall
450 SOUND0,-4,4,2
460 E=INT(X/60)*60:X=E+30:G=ABS(G)
470 IFE<9 E=10
480 IFE>1195 E=1211
490 IFY>599 AND Y<651 Y=599:T=10
```



SPACE HOPPER

BY ROSS FULFORD
RUNS ON A
TRS-80 LEVEL II
IN 16K

You could really get caught on the hop in this original graphics packed extravaganza. Space Hopper has five different stages to test your skill and dexterity.

In stage one you have to leap your Hopper over buildings as they move past. You earn 10 points for each leap — and as the game progresses the gaps get smaller.

Stage two sees the appearance of a dragon type monster in the top left hand corner of the screen. This monster grows bigger as you attempt to bounce your Hopper into flying bricks which flit across the screen at random heights. Then comes stage three which sees the monster start to move across the screen. You have to land your Hopper on the monster to win points.

Stage four and a spaceship appears. You have to guide the Hopper into the landing bay. You get 500 points for a successful docking — but take care as there's not much room for error and there is a time limit.

Three other space hoppers appear for the final stage — and you have to guide your Hopper onto one of its bouncing chums. You receive 300 points for a perfect landing.

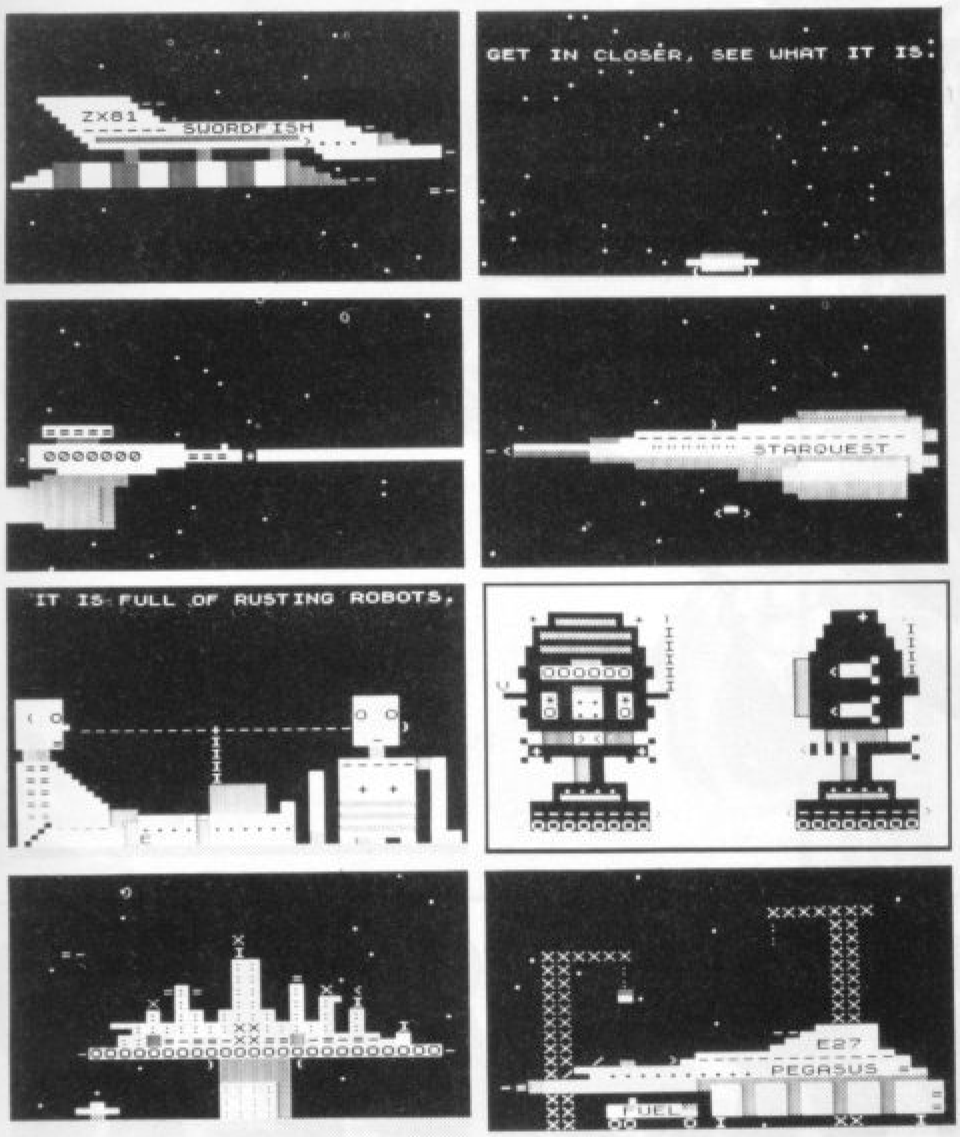
```
0 CLS:REM ** SPACE HOPPER BY >>> ROSS FULFORD <<<
1 CLEAR700:DEFINTA-Z:FORQ=1TO10:FORT=1TO10:OUT255,6:OUT255,7:OUT255,6:OUT255,5:N
EXT:FORT=1TO30:OUT255,6:OUT255,5:NEXT:FORT=1TO10:OUT255,6:OUT255,5:NEXT:FORT=1TO
10:OUT255,7:OUT255,6:NEXTT,Q
2 CLS:L$=CHR$(134)+CHR$(132):C=0:B=0:O=1020:Y=970:X1=0:S1=0:S2=0:E=3:GOSUB76
3 A$=CHR$(152)+CHR$(179)+CHR$(164)
4 GOSUB57:O=O-3:PRINT@O,F$;:N$="":M$=""
5 P=1:M=202:S=0:Z=0:U=0:D=0:A=0:X1=X1+1:IFX1<4S1=S1+1:S2=S2+5
6 FORQ=1TO6:FORT=1TO10:OUT255,6:OUT255,7:NEXT:FORT=1TO10:OUT255,6:OUT255,5:NEXTT
,Q
7 N=64:B$="   "
8 M$(1)=" "+CHR$(174)+CHR$(175)+CHR$(132)+"   "
9 M$(2)="  "+CHR$(160)+CHR$(165)+"   ":M$(3)=" "+CHR$(170)+CHR$(174)+CHR$(174)+"
 ":M$(4)="      ":M$(5)="      ":M$(6)="      "
10 FORT=1TO196STEP6:N$=N$+M$(RND(7-S1)):NEXT:M$=STRING$(50,32)+N$:PRINT@832,STRI
NG$(64,191);:X=15360:Z=1
11 PRINT@5,STRING$(10,191);
12 REM ** START OF FIRST MISSION **
13 OUT255,6:OUT255,7:G=PEEK(14400):PRINT@M,B$;:IFG=64M=M+1ELSEIFG=32M=M-1ELSEIFI
NKEY$="J"P=1
14 IFP=1S=S+1:M=M+N:IFS=9GOSUB17
15 PRINT@768,MID$(M$,Z,64);:IFPEEK(M+X+2)<>32ORPEEK(M+X)<>32GOSUB64ELSEPRINT@M,A
$;:Z=Z+1:IFM<769ANDP=0GOSUB64ELSEPRINT@990,B;
16 IFZ=255GOTO20ELSEGOTO13
17 S=0:IFN=-64N=64ELSEN=-64:P=0
18 B=B+5:RETURN
19 REM ** START OF SECOND MISSION **
20 FORQ=1TO8:FORT=1TO10:OUT255,6:OUT255,7:NEXT:FORT=1TO20:NEXTT,Q:PRINT@15,STRIN
```

Illustrations: Terry Rogers

```
G$(11,191);:C$=CHR$(130)+STRING$(3+S2,172)+CHR$(141):GOTO27
21 OUT255,6:OUT255,7:G=PEEK(14400):PRINT@M,B$;:IFG=64M=M+1ELSEIFG=32M=M-1ELSEIFI
NKEY$="J"P=1
22 IFP=1S=S+1:M=M+N:IFS=9GOSUB17
23 PRINT@M,A$;:D=D+1:Z=Z-1:IFPEEK(Z+X)<>32GOTO26ELSEPRINT@Z,D$;:IFM<769ANDP=0ORM
>828ANDP=0:GOSUB64
24 IFD>63GOSUB64ELSEPRINT@990,B;:GOTO21
25 GOTO21
26 B=B+20:PRINT@Z,"  ";:IFN=64GOTO27ELSES=9-S:N=64
27 OUT255,6:OUT255,5:PRINT@M,B$;:Z=RND(8)*64+255:A=A+1:PRINT@A+128,D$;:D$=MID$(C
$,A,1)+" ":D=0:IFA=LEN(C$)+1GOTO30
28 GOTO21
29 REM ** START OF THIRD MISSION **
30 FORQ=1TO8:FORT=1TO10:OUT255,6:OUT255,7:NEXT:FORT=1TO20:NEXTT,Q:C$=" "+C$:A=12
9:PRINT@25,STRING$(12,191);:PRINT@914,"BIG BONUS ";CHR$(94);:K=800
31 IFA=768GOTO110ELSEOUT255,6:OUT255,7:G=PEEK(14400):PRINT@M,B$;:IFG=64M=M+1ELSE
IFG=32M=M-1ELSEIFINKEY$="J"P=1
32 IFP=1S=S+1:M=M+N:IFS=9GOSUB17
33 A=A+1:PRINT@A,C$;:IFPEEK(M+X+1)<>32GOTO34ELSEPRINT@M,A$;:K=K-1:PRINT@926,K;:I
FM<769ANDP<>1ORM>828GOSUB64ELSEGOTO31
34 IFN=64ANDS<>0GOTO36ELSEPRINT@A,STRING$(12,32);:GOSUB64
35 GOTO31
36 FORQ=1TO10:FORT=1TO10:OUT255,6:OUT255,7:NEXT:FORT=1TO10:OUT255,6:OUT255,5:NEX
TT,Q:PRINT@914,CHR$(209);:B=B+K:PRINT@990,B;
37 PRINT@A,CHR$(220);:PRINT@M,B$;:M=M+64:IFM<768PRINT@M,A$;:FORT=1TO50:NEXT:GOTO
37
38 REM ** START OF FOURTH MISSION **
39 PRINT@M,A$;:G$=CHR$(174)+STRING$(8,187)+"    "+STRING$(8,183)+CHR$(157)
40 G1$="  "+CHR$(184)+CHR$(144)+"      "+CHR$(184)+STRING$(3,191)+CHR$(180)+"      "
+CHR$(160)+CHR$(180):S=0:N=-64:P=0
41 FORQ=1TO8:FORT=1TO10:OUT255,6:OUT255,7:NEXT:FORT=1TO20:NEXTT,Q:L=128:F=285
42 G2$=" "+CHR$(130)+CHR$(175)+STRING$(6,191)+"    "+STRING$(6,191)+CHR$(159)+CHR
$(129):PRINT@36,STRING$(12,191);:PRINT@276,G$;:PRINT@212,G1$;:PRINT@340,G2$;
43 OUT255,6:OUT255,7:G=PEEK(14400):PRINT@M,B$;:IFG=64M=M+1ELSEIFG=32M=M-1ELSEIFI
NKEY$="J"P=1
44 L=L-1:PRINT@L,CHR$(131);:IFL=64GOTO64
45 IFP=1:S=S+1:M=M+N:IFS=9GOSUB17
46 PRINT@M,A$;:H=2:IFM=FTHENGOTO47ELSEIFPEEK(M+X-64)<>32GOTO64ELSEGOTO43
47 B=B+500:PRINT@990,B;:FORQ=1TO10:FORT=1TO10:OUT255,6:OUT255,7:NEXT:FORT=1TO10:
OUT255,6:OUT255,5:NEXT:FORT=1TO10:NEXTT,Q
48 REM ** START OF FIFTH MISSION  **
49 H=1:A$(1)=CHR$(166)+CHR$(191)+CHR$(153):A$(2)=CHR$(166)+CHR$(140)+CHR$(153):A
$(3)=CHR$(152)+CHR$(179)+CHR$(164):P=0
50 PRINT@49,STRING$(10,191);:PRINT@728,A$(1);:PRINT@733,A$(2);:PRINT@738,A$(3);
51 OUT255,6:OUT255,7:G=PEEK(14400):PRINT@M,B$;:IFG=64M=M+1ELSEIFG=32M=M-1ELSEIFI
NKEY$="J"P=1
52 L=L-1:PRINT@L,CHR$(131);:IFL=64GOSUB64ELSEIFP=1M=M+64:IFM>767GOSUB64
53 IFPEEK(M+X)<>32ORPEEK(M+X+2)<>32GOTO54ELSEPRINT@M,A$;:GOTO51
54 FORT=1TO80:OUT255,6:OUT255,7:NEXT:FORT=1TO60:OUT255,6:OUT255,5:NEXT:FORT=1TO8
0:OUT255,6:OUT255,7:NEXT
55 B=B+300:PRINT@990,B;:IFM=728THENE=1ELSEIFM=733THENE=2ELSEIFM=738THENE=3ELSEE=
E:GOSUB64
56 A$=A$(E):FORT=1TO500:NEXT:FORT=128TO768STEP64:PRINT@T,STRING$(64,32);:NEXT:GO
TO4
57 REM ** SET UP SCREEN **
58 G$=CHR$(191)+STRING$(10,131)
59 PRINT@4,G$;G$;G$;G$;G$;CHR$(191);:PRINT@64,STRING$(64,143);
60 PRINT@64,STRING$(64,143);:PRINT@960,CHR$(191);:FORT=45TO47:SET(126,T):SET(127
,T):NEXT
61 PRINT@978,"SCORE >>>>>";:PRINT@832,STRING$(65,191);:PRINT@959,CHR$(191);:F$=C
HR$(153)+CHR$(145)
62 RETURN
63 REM ** EXPLOSION **
64 D=0:Y=Y-4:C=C+1:PRINT@M,CHR$(146)+CHR$(160)+CHR$(130)+CHR$(144);:FORT=1TO60:O
UT255,6:OUT255,5:NEXT:IFC=3GOTO68ELSEPRINT@Y,"  ";:PRINT@M,"    ";:ONHGOTO65,66
65 M=202:P=1:N=64:S=0:RETURN
66 PRINT@64,STRING$(64,143):L=128:M=330:P=1:N=64:S=2:GOTO42
67 REM ** END OF GAME **
68 FORQ=1TO10:PRINT@405,"**** GAME OVER ****";:FORT=1TO10:OUT255,6:OUT255,7:NEXT
:PRINT@405,STRING$(19,32);
```

```
69 FORT=1TO10:OUT255,6:OUT255,7:NEXTT,Q
70 CLS:FORT=0TO896STEP64:PRINT@T,"SPACE HOPPER";:PRINT@T+52,"SPACE HOPPER";:NEXT
71 IFB>VTHENFORQ=1TO10:PRINT@405,"NEW HIGH SCORE >>>";B;:FORT=1TO30:OUT255,6:OUT
255,5:NEXT:PRINT@405,"*****************";:FORT=1TO30:NEXTT,Q:V=B:GOSUB111
72 PRINT@405,"     YOUR SCORE >>>>>";B;"     ";:PRINT@470,"HIGHEST SCORE >>>>>";V;:
FORQ=1TO10:FORT=1TO10:OUT255,6:OUT255,7:NEXT
73 FORT=1TO10:OUT255,6:OUT255,5:NEXT:FORT=1TO20:NEXTT,Q
74 PRINT@847,"**** PRESS ENTER TO PLAY AGAIN ****";:I$=INKEY$:IFI$<>CHR$(13)GOTO
74ELSEGOTO2
75 REM ** SET UP TITLE PAGE **
76 PRINT@67,"PLAY....";:FORT=1TO200:NEXT:PRINT@112,"HIGHEST SCORER";
77 T$=STRING$(2,191)+CHR$(143)+STRING$(2,191):T1$=STRING$(2,191):T2$=STRING$(2,1
31)
78 PRINT@137,T$;" ";T$;" ";T$;" ";T$;" ";T1$;STRING$(3,143);:PRINT@201,T1$;S
TRING$(3,188);" ";T1$;CHR$(188);T1$;" ";T1$;
80 PRINTCHR$(188);T1$;" ";T1$;"     ";T1$;STRING$(3,188);:PRINT@265,STRING$(2,1
88);CHR$(176);T1$;
81 PRINT" ";T1$;"     ";T1$;" ";T1$;" ";T1$;CHR$(176);STRING$(2,188);"  ";T1$;
STRING$(3,176);
82 PRINT@329,T2$;T2$;CHR$(131);" ";T2$;"     ";T2$;" ";T2$;" ";T2$;T2$;CHR$(13
1);" ";T2$;T2$;CHR$(131);
83 PRINT@457,T1$;" ";T1$;" ";T$;" ";T$;" ";T$;" ";T1$;STRING$(3,143);" ";T$
;
84 PRINT@521,T1$;STRING$(1,188);T1$;" ";T1$;" ";T1$;" ";T1$;CHR$(188);T1$;" "
;T1$;CHR$(188);T1$;" ";T1$;STRING$(3,188);
85 PRINT" ";T1$;CHR$(188);T1$;
86 PRINT@649,T2$;" ";T2$;" ";T2$;T2$;CHR$(131);" ";T2$;"     ";T2$;" ";T2$
;T2$;CHR$(131);" ";T2$;" ";CHR$(131);
87 PRINT@585,T1$;" ";T1$;" ";T1$;" ";T1$;" ";T1$;"     ";T1$;" ";T1$;STRIN
G$(3,176);" ";T1$;" ";CHR$(191);
88 PRINT@0,STRING$(64,131);:PRINT@896,STRING$(64,176);:FORT=0TO896STEP64:PRINT@T
,CHR$(191);:PRINT@T+63,CHR$(191);:NEXT
89 FORT=180TO757STEP64:PRINT@T,H$;:NEXT
90 FORQ=1TO15:FORT=1TO15:OUT255,6:OUT255,5:NEXTT,Q:PRINT@834,"******* PRESS <ENT
ER> TO START <I> FOR INSTRUCTIONS *******";
91 I$=INKEY$:IFI$="I"GOTO94
92 T=T+1:IFT=200GOTO90ELSEIFI$=CHR$(13)GOTO93ELSE91
93 CLS:PRINT@962,L$;" ";L$;:GOTO58
94 CLS
95 PRINT@13,"*** *** *** SPACE HOPPER *** *** ***";
96 PRINT@256,"<1>  JUMP OVER BUILDINGS  >>>>>>>>>>>>>>>>  10 POINTS EACH JUMP";
97 PRINT@77,STRING$(12,131);STRING$(11,179);STRING$(13,131);
98 PRINT@153,CHR$(191);" MISSION ";CHR$(191);
99 PRINT@320,"<2>  JUMP INTO EACH SEGMENT AS THEY FLY ACROSS  > 20 POINTS EACH "
;
100 PRINT@384,"<3>  JUMP ONTO THE <<BACK>> OF THE MONSTER  >>>>>>  BONUS POINTS"
;
101 PRINT@448,"<4>  DOCK WITH STATION !!! BE QUICK !!!  >>>>>>>>>>>  500 POINTS"
;
102 PRINT@512,"<5>  GUIDE YOUR HOPPER ONTO ANOTHER >>>>>>>>>>>>>>>>  300 POINTS"
;
103 PRINT@660,"USE ";CHR$(93);" AND ";CHR$(94)" TO MOVE";:PRINT@788,">>> J <<<
 TO JUMP";
104 FORQ=1TO10:FORT=1TO10:OUT255,6:OUT255,5:NEXT:FORT=1TO10:OUT255,5:OUT255,6:NE
XT:FORT=1TO10:NEXT:FORT=1TO10:OUT255,6:OUT255,7:NEXTT,Q
105 PRINT@910,"***** PRESS ENTER TO PLAY *****";:IFINKEY$=CHR$(13)GOTO93ELSES=S+
1:IFS>200GOTO106ELSEGOTO105
106 FORT=900TO640STEP-64:PRINT@T,CHR$(152)+CHR$(179)+CHR$(164);:PRINT@T+64,"   "
;:FORQ=1TO50:NEXTQ,T
107 PRINT@T+64,"   ";:FORQ=1TO10:PRINT@T,CHR$(137)+CHR$(179)+CHR$(134);:FORM=1TO
50:NEXT:PRINT@T,CHR$(152)+CHR$(179)+CHR$(164);
108 FORM=1TO50:NEXTM,Q:FORT=644TO836STEP64:PRINT@T,CHR$(152)+CHR$(179)+CHR$(164)
;:PRINT@T-64,"   ";:FORM=1TO50:NEXTM,T
109 FORM=T-64TOT-10:PRINT@M," "+CHR$(152)+CHR$(179)+CHR$(164);:FORS=1TO10:NEXTS,
M:PRINT@M,"    ";:S=0:GOTO95
110 PRINT@768,STRING$(64,42);:FORT=1TO100:NEXT:FORT=1TO80:OUT255,6:OUT255,5:NEXT
:PRINT@768,STRING$(64,32);:B=0:PRINT@990,B;:GOTO39
111 PRINT@405,CHR$(220);:PRINT@405,"WHAT IS YOUR NAME ";:INPUTH$:IFLEN(H$)>6GOTO
111ELSEFORQ=1TO15:FORT=1TO10:OUT255,6:OUT255,7:OUT255,6:OUT255,5:NEXTT,Q
112 PRINT@448,"SPACE HOPPER";:PRINT@500,"SPACE HOPPER";:RETURN
```

Illustration: Terry Rogers



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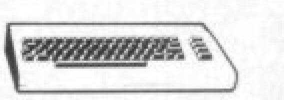
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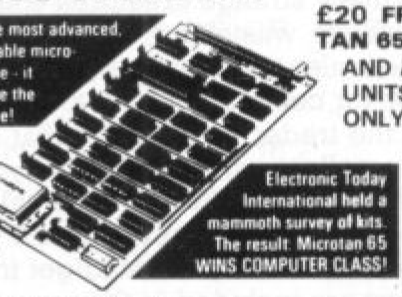
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FUR TRADER

It sure was a tough life being a trapper out in the wilderness. If a great big grizzly bear didn't get you then the fierce winters would do their best to finish you off. But I don't regret a moment of it. There's nothing quite like walking into a trading post with armfuls of furs and doing a bit of haggling to get the best price.

A lot of you young whippersnappers have been asking me just what it was like chasing little furry animals around for their valuable skins. Well now you can relive those bygone days from the comfortable surroundings of your ZX81.

Among the many strange creatures you'll come across out in that desolate wasteland, are ocelots, rabbits and coyotes. There is also the little known haggis, a wondrous beastie, whose fur commands some of the best rates — if you can beat the trader up in price, that is!

You have to collect as many furs as you can and get them to the trading post. But you must take into account your supplies of food and water — and if you are getting enough sleep. Otherwise you could get into big trouble! The instructions are included in the program. Good luck and good hunting!

BY J. S. YOUNGMAN

```
   5 REM WRITTEN BY J.S.YOUNGMAN
   6 LET ERV=0
   7 CLS
   8 LET HF=5
   9 LET CF=50
  10 LET OF=100
  11 LET RF=200
  12 LET H=7
  13 LET D=7
  14 LET F=5
  15 LET M=100
  16 LET T=0
  17 GOTO 7000
  25 CLS
  30 PRINT AT 3,0;"YOUR COMMANDS
```

RUNS ON A ZX81

```
 ARE :"
  40 PRINT
  50 PRINT "<1> LOOK FOR TRADING
 POST."
  60 PRINT "<2> GO TO BED."
  70 PRINT "<3> EAT/DRINK FOOD A
ND WATER."
  80 PRINT "<4> FOOD/HUNGER/REST
/STORES CK."
  90 PRINT
 100 PRINT
 110 PRINT "COMMANDS AT TRADING
POST ONLY."
 120 PRINT
 130 PRINT "<5> SEE GOING EXCHAN
GE RATE."
 140 PRINT "<6> MAKE A DEAL."
 150 PRINT AT 21,0;"WHAT IS YOUR
 COMMAND ?"
 160 INPUT A
 170 IF INT A<>A OR A<1 OR A>6 T
HEN GOTO 9020
 180 IF NOT T AND A>4 THEN GOTO
9040
 185 IF A=6 AND ERV=0 THEN GOTO
9000
 190 CLS
 200 GOTO A*1000
1000 IF INT ((RND*10)+1)>6 THEN
GOTO 1500
1010 LET T=1
1020 PRINT AT 8,0;"CONGRATULATIO
NS . YOU HAVE FOUND          A TRA
DING POST."
1025 LET A=INT (RND*2)+1
1030 PRINT
1035 IF A=1 THEN LET F=F+1
1040 IF A=1 THEN PRINT "YOU ALSO
 MANAGED TO REFILL YOUR
STORE OF FOOD ."
1045 PAUSE 100
1050 GOTO 17
1500 LET T=0
1510 PRINT AT 11,0;" BAD LUCK.YO
U DID NOT MANAGE TO  FIND A TRAD
ING POST ANYWHERE ."
```



```
1515 PAUSE 100
1520 GOTO 17
2000 LET A=INT (RND*5)+1
2005 IF A<>1 THEN LET D=7
2010 PRINT AT 10,0;"NIGHT NIGHT.
SLEEP TIGHT;MIND THE         BUGS
 DON""T BITE."
2011 PAUSE 100
2012 IF A=1 THEN PRINT AT 15,0;"
THE BED BUGS BIT AND YOU DID NOT
    MANAGE TO GET ANY SLEEP."
2013 IF A=1 THEN PRINT AT 17,0;"
"
2014 IF A=1 THEN PRINT AT 18,6;"
  ▛▛▛▛▛▛"
2015 IF A=1 THEN PAUSE 100
2020 GOTO 17
3010 IF F<>0 THEN PRINT AT 11,0;
"YOU HAVE NOW TAKEN THE LOAD OFF
        ONE PACKHORSE."
3015 IF F<>0 THEN LET H=7
3020 IF F=0 THEN PRINT AT 11,0;"
BAD LUCK.THERE IS NO FOOD LEFT."
3030 IF F<>0 THEN LET F=F-1
3035 PAUSE 100
3040 GOTO 17
4000 PRINT "FOOD / HUNGER / REST
 / STORES CK"
4010 PRINT AT 3,0;"YOU HAVE ";HF
;" HAGGIS FURS."
4020 PRINT
4030 PRINT "YOU HAVE ";CF;" COYO
TE FURS."
4040 PRINT
4050 PRINT "YOU HAVE ";OF;" OCEL
OT FURS."
4060 PRINT
4070 PRINT "YOU HAVE ";RF;" RABB
IT FURS."
4080 PRINT AT 12,0;"YOU CAN SURV
IVE ";H;" COMMANDS  WITHOUT ANY
FOOD."
4090 PRINT
4100 PRINT "YOU HAVE ";F;" PACK-
HORSES OF FOOD AND WATER."
4110 PRINT
4120 PRINT "YOU CAN SURVIVE ";D;
" COMMANDS  WITHOUT ANY REST."
4125 PRINT AT 21,0;"YOU NOW HAVE
 £";M
4130 PAUSE 32768
4140 GOTO 17
5000 IF ERV=1 THEN GOTO 5040
5005 LET HFP=INT (RND*40)+61
5010 LET CFP=INT (RND*30)+31
5020 LET OFP=INT (RND*20)+11
5030 LET RFP=INT (RND*10)+1
5040 PRINT TAB 9;"EXCHANGE RATE.
"
5050 PRINT AT 4,0;"HAGGIS FUR =
£";HFP
5060 PRINT AT 8,0;"COYOTE FUR =
£";CFP
5070 PRINT AT 12,0;"OCELOT FUR =
£";OFP
5080 PRINT AT 16,0;"RABBIT FUR =
£";RFP
5090 PAUSE 32768
5095 LET ERV=1
5100 GOTO 17
6000 PRINT AT 4,0;"YOU HAVE ";HF
;"  HAGGIS FURS"
6010 PRINT AT 8,0;"YOU HAVE ";CF
;"  COYOTE FURS"
6020 PRINT AT 12,0;"YOU HAVE ";O
F;"  OCELOT FURS"
6030 PRINT AT 16,0;"YOU HAVE ";R
F;"  RABBIT FURS"
6035 PRINT AT 0,0;"YOU NOW HAVE
A TOTAL OF £";M
6040 PRINT AT 20,0;"HOW MANY HAG
GIS FURS WOULD YOU  LIKE TO SELL
?"
6045 IF HF<=0 THEN GOTO 6090
6050 INPUT X
6055 LET X=INT X
6060 IF X>HF OR X<0 THEN GOTO 60
50
6070 LET M=M+(X*HFP)
6075 PRINT AT 0,25;M;"  "
6080 LET HF=HF-X
6085 PRINT AT 4,9;HF;"  "
6090 PRINT AT 20,9;"COYOTE FURS"
6095 IF CF<=0 THEN GOTO 6140
6100 INPUT X
6105 LET X=INT X
6110 IF X>CF OR X<0 THEN GOTO 61
00
6120 LET M=M+(X*CFP)
6125 PRINT AT 0,25;M;"  "
6130 LET CF=CF-X
6135 PRINT AT 8,9;CF;"  "
6140 PRINT AT 20,9;"OCELOT FURS"
6145 IF OF<=0 THEN GOTO 6180
6150 INPUT X
6153 LET X=INT X
6155 IF X>OF OR X<0 THEN GOTO 61
50
6160 LET M=M+(X*OFP)
6165 PRINT AT 0,25;M;"  "
6170 LET OF=OF-X
6175 PRINT AT 12,9;OF;"  "
6180 PRINT AT 20,9;"RABBIT FURS"
6185 IF RF<=0 THEN GOTO 6220
6190 INPUT X
6193 LET X=INT X
6195 IF X>RF OR X<0 THEN GOTO 61
90
6200 LET M=M+(X*RFP)
6205 PRINT AT 0,25;M;"  "
6210 LET RF=RF-X
6215 PRINT AT 16,9;RF;"  "
6220 PRINT AT 20,9;"HAGGIS FURS
WOULD YOU  LIKE TO BUY ?"
6225 IF M<HFP THEN GOTO 6270
6230 INPUT X
6235 LET X=INT X
6240 IF (X*HFP)>M OR X<0 THEN GO
TO 6230
6250 LET M=M-(X*HFP)
6255 PRINT AT 0,25;M;"  "
6260 LET HF=HF+X
6265 PRINT AT 4,9;HF;"  "
6270 PRINT AT 20,9;"COYOTE FURS"
6275 IF M<CFP THEN GOTO 6320
6280 INPUT X
6285 LET X=INT X
6290 IF (X*CFP)>M OR X<0 THEN GO
TO 6280
6300 LET M=M-(X*CFP)
6305 PRINT AT 0,25;M;"  "
6310 LET CF=CF+X
6315 PRINT AT 8,9;CF;"  "
6320 PRINT AT 20,9;"OCELOT FURS"
6325 IF M<OFP THEN GOTO 6370
6330 INPUT X
6335 LET X=INT X
6340 IF (X*OFP)>M OR X<0 THEN GO
TO 6330
6350 LET M=M-(X*OFP)
6355 PRINT AT 0,25;M;"  "
6360 LET OF=OF+X
6365 PRINT AT 12,9;OF;"  "
6370 PRINT AT 20,9;"RABBIT FURS"
6375 IF M<RFP THEN GOTO 6420
6380 INPUT X
6385 LET X=INT X
6390 IF (X*RFP)>M OR X<0 THEN GO
TO 6380
6400 LET M=M-(X*RFP)
```

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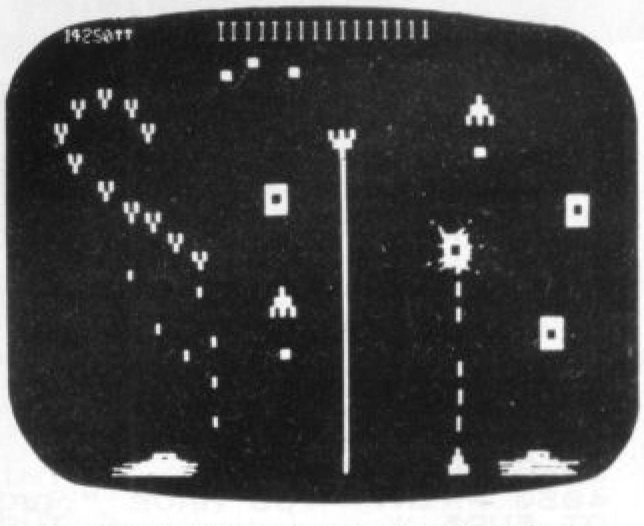
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Galactic FIREBIRD



For TANDY TRS-80 & VIDEO GENIE

Those ever circling, swooping, diving Firebirds of the famous arcade machines, brought to the micro in Mike Chalk's ultimate achievement—Galactic Firebird

Yes, it's the latest in the Kansas Arcade series, but alas, his last, for Mike has been writing these right back from the original Arcade Invaders, and feels he wants a rest.

The reason being that he has always bettered his preceeding program, and feels that with Firebird he has reached a pinnacle.

Many programmers of many machines have tried to emulate the arcade game, Firebird, but nobody, the Americans included, have managed to get the circling, swooping firebirds on a computer. Until now!

It is incredible how the Firebirds peel away, circle around in numerous positions on the screen, then suddenly sweep in to attack, all the while raining down their bombs.

Even if you manage to dodge all their bombs whilst shooting them down, it is as though they realise they will not get you this way, for without warning they'll take kamikazi action and come straight for you!

Then come the Astro Blasters, shooting down a solid energy bolt, to fry you completely, in adition to their own brand of super bomb. Oh, you can fire at them, but a solitary hit will have no effect whatsoever on these nasties.

As though Firebirds and Astro Blasters are not enough, as the game progresses, come the Megon Bombs. With no less than three hits needed to destruct! And you can't dodge them easily either, as their explosions spread.

Scores are kept of course, and there is the now expected realistic sound effects. And—wait for it—it progresses to FOURTEEN levels of difficulty! Mike's last words: "Nobody will ever get there!"

It's ONLY available direct from Kansas but at a sensible £9.50 Vat and post paid

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Kansas City Systems, Unit 3, Sutton Springs Wood, Chesterfield, S44 5XF. Tel. 0246 850357

```
6405 PRINT AT 0,25;M;"    "
6410 LET RF=RF+X
6413 PRINT AT 16,9;RF;"    "
6415 LET T=0
6420 LET ERV=0
6425 GOTO 17
7000 CLS
7005 LET D=D-1
7010 LET H=H-1
7020 IF H<0 THEN GOTO 8020
7030 IF D<0 THEN GOTO 8000
7040 IF INT (RND*125)>5 THEN GOT
O 7200
7050 LET HF=HF-INT (RND*(HF/2))
7070 LET CF=CF-INT (RND*(CF/2))
7090 LET OF=OF-INT (RND*(OF/2))
7110 LET RF=RF-INT (RND*(RF/2))
7130 PRINT AT 9,0;"  SOME ROBBER
S HAVE JUST ROBBED YOUR PACK HOR
SES OF SOME OF YOUR
FURS."
7140 PAUSE 300
7150 CLS
7200 IF INT (RND*125)>5 THEN GOT
O 7250
7210 LET M=M-INT (RND*(M/2))
7220 PRINT AT 9,0;" SOME ROBBERS
 HAVE JUST ROBBED  YOUR PACK HOR
SES OF SOME OF YOUR
 MONEY."
7230 PAUSE 300
7240 CLS
7250 GOTO 20
8000 PRINT "YOU DIED DUE TO A LA
CK OF REST."
8010 GOTO 8030
8020 PRINT "BAD LUCK.YOU STARVED
 TO DEATH."
8030 PRINT
8040 PRINT "YOU HAD ";F;" PACK-H
ORSES OF FOOD AND WATER LEFT"
8060 PRINT "YOU COULD HAVE SURVI
VED ";D;" DAYS WITHOUT REST"
8080 PRINT "YOU COULD HAVE SURVI
VED ";H;" DAYS WITHOUT FOOD/WATE
R"
8100 PRINT
8110 PRINT "IN YOUR WILL,YOU LEF
T :"
8112 LET M=M+(HF*HFP)
8114 LET M=M+(CF*CFP)
8116 LET M=M+(OF*OFP)
8118 LET M=M+(RF*RFP)
8120 PRINT
8130 PRINT "A TOTAL OF £";M;" NE
T."
8140 PRINT
8150 PRINT "( ";HF;" HAGGIS FURS
 )"
8160 PRINT
8170 PRINT "( ";CF;" COYOTE FURS
 )"
8180 PRINT
8190 PRINT "( ";OF;" OCELOT FURS
 )"
8200 PRINT
8210 PRINT "( ";RF;" RABBIT FURS
 )"
8220 PAUSE 32768
8230 GOTO 7
9000 PRINT AT 17,0;"       WHAT ABO
UT COMMAND (5) ?         "
9005 PAUSE 500
9010 GOTO 25
9020 PRINT AT 17,0;"PLEASE ENTER
 A CORRECT COMMAND .       "
9025 PAUSE 500
9030 GOTO 25
9040 PRINT AT 17,0;" YOU ARE NOT
 AT A TRADING POST .       "
9045 PAUSE 500
9050 GOTO 25
```

```
YOUR COMMANDS ARE :

(1) LOOK FOR TRADING POST.
(2) GO TO BED.
(3) EAT/DRINK FOOD AND WATER.
(4) FOOD/HUNGER/REST/STORES CK.

COMMANDS AT TRADING POST ONLY.

(5) SEE GOING EXCHANGE RATE.
(6) MAKE A DEAL.

WHAT IS YOUR COMMAND ?
```

```
FOOD / HUNGER / REST / STORES CK

YOU HAVE 5 HAGGIS FURS.

YOU HAVE 50 COYOTE FURS.

YOU HAVE 100 OCELOT FURS.

YOU HAVE 200 RABBIT FURS.

YOU CAN SURVIVE 6 COMMANDS WITH
OUT ANY FOOD.

YOU HAVE 5 PACK-HORSES OF FOOD A
ND WATER.

YOU CAN SURVIVE 6 COMMANDS  WITH
OUT ANY REST.

YOU NOW HAVE £100
```

```
        EXCHANGE RATE.


HAGGIS FUR = £64


COYOTE FUR = £32


OCELOT FUR = £15


RABBIT FUR = £7
```

```
YOU NOW HAVE A TOTAL OF £100

YOU HAVE 5    HAGGIS FURS

YOU HAVE 50    COYOTE FURS

YOU HAVE 100    OCELOT FURS

YOU HAVE 200    RABBIT FURS

HOW MANY HAGGIS FURS WOULD YOU
LIKE TO SELL ?
```

```
YOU DIED DUE TO A LACK OF REST.

YOU HAD 0 PACK-HORSES OF FOOD AN
D WATER LEFT
YOU COULD HAVE SURVIVED -1 DAYS
WITHOUT REST
YOU COULD HAVE SURVIVED 6 DAYS W
ITHOUT FOOD/WATER

IN YOUR WILL,YOU LEFT :

A TOTAL OF £5367 NET.

( 5 HAGGIS FURS )

( 50 COYOTE FURS )

( 100 OCELOT FURS )

( 200 RABBIT FURS )
```



MARTIAN EXPLORER

RUNS IN 32K ON AN ATARI 400/800 WITH JOYSTICKS

BY MARTIN CRAWLEY

Here's your chance to bodly go where no games player has gone before — deep into the mysterious caverns of the red planet Mars.

Fly your spacecraft through the network of wierd and wonderful underground caves and tunnels — but remember you could run out of fuel. Luckily for you previous Martian explorers have left fuel dumps which you can use — if you can land safely among the rocks cavern floor.

The landing pad is coloured light green and is located on the right hand side of your screen. Once down safely your ship will be refuelled and the next cavern will appear. Points are awarded for a safe landing — based on the difficulty level and the amount of fuel you have left.

You have a display which tells you your speed and fuel the amount of fuel in your ship's tanks. If you come into land at a speed greater than 10 units you will crash. And of course you have to avoid contact with the cavern walls during your flight. You get five ships per game.

To get the action underway all you have to do is press the red button on your joystick. This ignites your ship's engines. Gravity is simulated in this program so when you release the button your craft slows down — and will gradually start to fall downwards at a gradually increasing speed.

No error loops have been included to cover the accidental flight of a spaceship off the cursor end of the screen and if this happens an error message will ensue. So you should take care not to send your craft off the screen in this way.

It is important that lines 4130 and 4140 are fed in exactly as indicated otherwise the fuel and speed indicators will appear in the wrong position relative to the dials.

Variables

LV: Cavern level.
LM: Number of spaceship in action.
S: vertical speed of ship.
HL, HS: In combination determine the horizontal speed of the ship
L: Flag indicating collision of ship with cavern walls.
XMϕ, YMϕ: Horizontal and vertical position of fuel indicator.
XMI, YMI: Horizontal and vertical position of speed indicator.
Xϕ, Yϕ: Horizontal and vertical position of spaceship.
SC: score.
FD: Rate of fuel consumption.

```
10 OPEN #1,4,0,"K:"
20 PMBASE=54279:RAMTOP=106:SDMCTL=559
30 HITCLR=53278:P0PF=53252:GRACTL=53277
40 HPOSP0=53248:HPOSM0=53252:HPOSP1=5324
9:HPOSM1=53253
50 FCOLR0=704:PCOLR1=705
70 DATA 104,104,104,133,205,104,104,133,
207,160,1,169,0,133,204,133,206,177,204,
136,145,204,200,200,208,247,160
71 DATA 1,177,206,136,145,206,200,200,20
8,247,96,104,104,104,133,205,104,104,133
,207,160,254,169
72 DATA 0,133,204,133,206,177,204,200,14
5,204,136,136,208,247,160,254,177,206,20
0,145,206,136,136,208,247,96
73 DATA 104,104,104,133,205,162,0,160,25
5,169,0,133,204,169,0,145,204,136,208
74 DATA 249,232,138,24,169,01,101,205,13
3,205,160,255,224,4,208,234,96
75 RESTORE (70)
80 FOR I=0 TO 111
85 READ A
90 POKE 1536+I,A
95 NEXT I
98 GOSUB 3000
100 GOSUB 4000
110 GOSUB 5000
180 LV=1
185 LM=1
190 S=0
192 SETCOLOR 2,0,0:SETCOLOR 4,0,0
194 POKE PCOLR0,88:POKE PCOLR1,30
195 POKE HITCLR,0
196 HL=0
198 HS=0
200 FOR K=0 TO HL
205 S=S+0.05:POKE HPOSM1,10*S+140
210 L=PEEK(P0PF):IF L<>0 THEN GOTO 1000
```

Illustration: Dorian Cross

```
220 IF XM0<110 THEN X1=5:POKE HPOSP1,5:S
OUND 0,0,0,0:SOUND 1,0,0,0:GOTO 240
228 POKE HPOSP0,X0
230 IF STRIG(0)=0 THEN X1=X0:POKE HPOSP1
,X1:SOUND 0,204,0,8:SOUND 1,128,0,8:XM0=
XM0-FD:POKE HPOSM0,XM0:S=S-0.1
240 IF STRIG(0)=1 THEN X1=5:POKE HPOSP1,
X1:SOUND 0,0,0,0:SOUND 1,0,0,0
250 IF S>0 THEN GOTO 300
260 IF S<0 THEN GOTO 400
270 GOTO 500
300 FOR I=0 TO S:RES=USR(1574,P0,P1):Y0=
Y0+1:NEXT I
330 GOTO 500
400 FOR I=S TO 0:RES=USR(1536,P0,P1):Y0=
Y0-1:NEXT I
400 GOTO 500
500 NEXT K
505 HL=5-5*ABS(HS)
510 IF STICK(0)=15 AND HS<0 THEN HS=HS+0
.01:SOUND 2,0,0,0:GOTO 525
515 IF STICK(0)=15 AND HS>0 THEN HS=HS-0
.01:SOUND 2,0,0,0:GOTO 525
520 IF STICK(0)>4 AND STICK(0)<8 THEN HS
=HS+0.35:SOUND 2,10,0,4:IF HS>1.5 THEN H
S=1.5
522 IF STICK(0)>8 AND STICK(0)<12 THEN H
S=HS-0.35:SOUND 2,10,0,4:IF HS<-1 THEN H
S=-1
525 X0=X0+INT(HS)
530 GOTO 200
1000 POKE HITCLR,0
1010 POKE HPOSP1,5:SOUND 0,0,0,0:SOUND 1
,0,0,0
1014 ON LV GOTO 1100,1200,1300
1020 IF STRIG(0)=0 THEN GOTO 1040
1030 GOTO 1020
1040 FOR I=0 TO 1
1050 RES=USR(1536,P0,P1)
1060 NEXT I
1070 GOTO 190
1100 IF X0>51 AND X0<73 AND Y0>130 AND S
<1 THEN GOTO 1020
1110 IF X0>153 AND X0<171 AND Y0>140 AND
 S<1 THEN GOTO 1120
1115 GOTO 2000
1120 SC=DF*(INT(XM0)-110)
1130 GOSUB 4115
1132 FOR J=1 TO 500:NEXT J
1135 POKE PCOLR0,0:POKE PCOLR1,0
1140 X0=65:X1=65:Y0=144:Y1=151:YM0=197:Y
M1=207:XM0=190
1150 POKE HPOSP0,65:POKE HPOSP1,5:POKE H
POSM0,190
1155 LV=2
1160 COLOR 1
1162 GOSUB 4200
1164 POKE 752,1
1165 GOSUB 4115
1168 GOSUB 5040
1170 GOTO 190
1200 IF X0>53 AND X0<72 AND Y0>130 AND S
<1 THEN GOTO 1020
1210 IF X0>160 AND X0<175 AND Y0>160 AND
 S<1 THEN GOTO 1220
1215 GOTO 2000
1220 SC=SC+3*DF*(INT(XM0)-110)
1230 GOSUB 4115
1232 FOR J=1 TO 500:NEXT J
1235 POKE PCOLR0,0:POKE PCOLR1,0
1240 X0=58:X1=58:Y0=175:Y1=182:YM0=197:Y
M1=207:XM0=190
1250 POKE HPOSP0,58:POKE HPOSP1,5:POKE H
POSM0,190
1255 LV=3
1260 GRAPHICS 7:SETCOLOR 2,0,0:COLOR 1
1262 GOSUB 4300
1264 POKE 752,1
1266 GOSUB 4115
1268 GOSUB 5040
1270 GOTO 190
1300 IF X0>50 AND X0<66 AND Y0>160 AND S
<1 THEN GOTO 1020
1310 IF X0>176 AND X0<191 AND Y0>150 AND
```



Illustration: Dorian Cross

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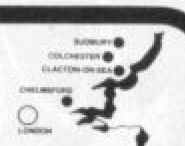
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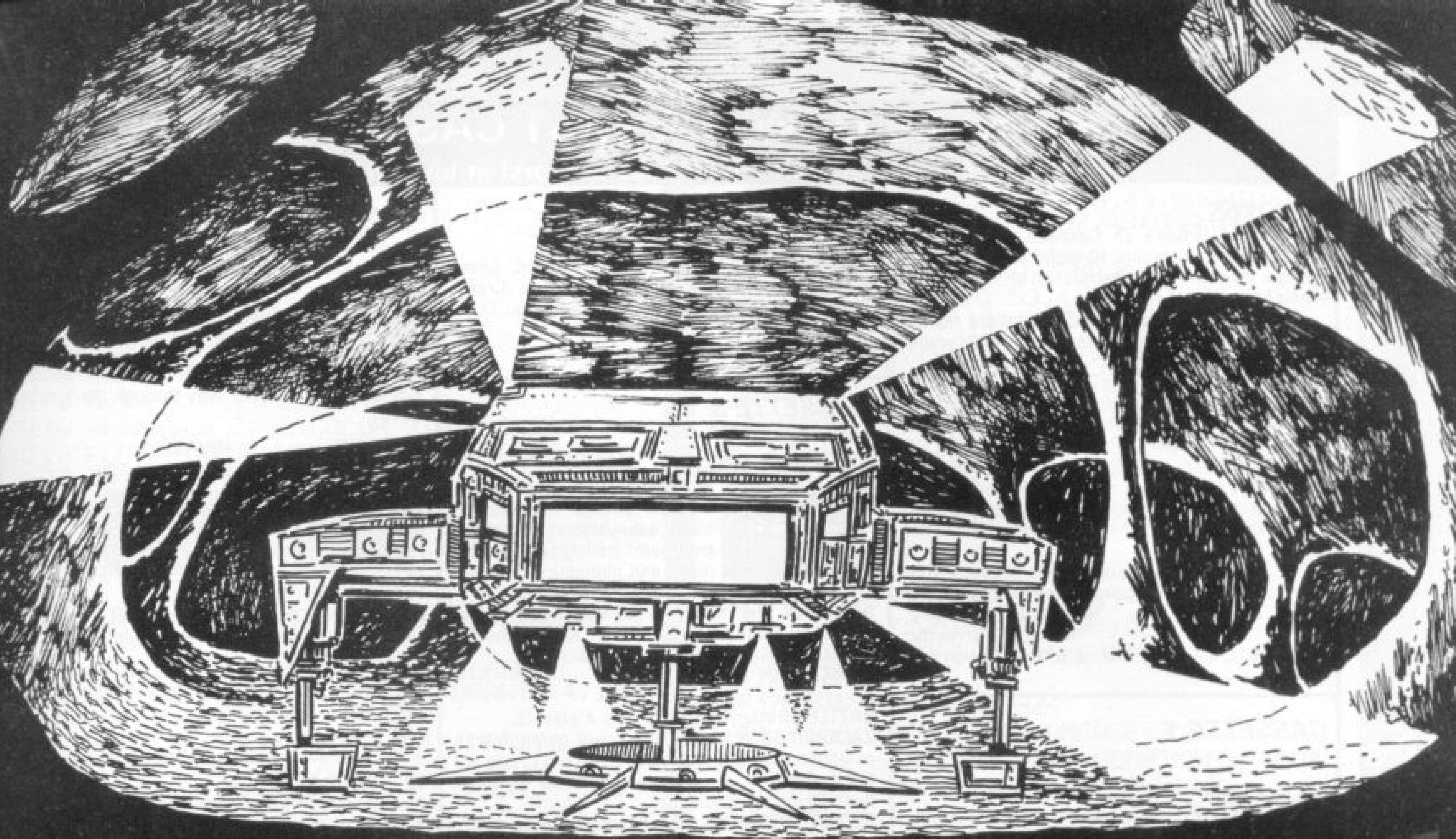


Illustration: Dorian Cross

```
S<1 THEN GOTO 1320
1315 GOTO 2000
1320 SC=SC+15*DF*(INT(XM0)-110)+50*DF*(5
-LM)
1325 GOTO 2500
2000 LM=LM+1
2005 GRAPHICS 0
2006 POKE HPOSP0,5:POKE HPOSP1,5:POKE HP
OSM0,5:POKE HPOSM1,5
2010 FOR I=0 TO 16
2015 FOR J=0 TO 10
2018 SETCOLOR 4,I,10
2020 SETCOLOR 2,I,10:SOUND 0,10*I,0,10:S
OUND 1,5*I,0,10
2030 NEXT J:NEXT I
2040 SOUND 0,0,0,0:SOUND 1,0,0,0:SOUND 2
,0,0,0
2050 IF LM>5 THEN GOTO 2100
2052 GRAPHICS 7
2055 SETCOLOR 2,0,0:SETCOLOR 4,0,0
2060 ON LV GOTO 2070,2080,2090
2070 GOSUB 4000:GOSUB 5000:GOTO 190
2080 GOTO 1135
2090 GOTO 1235
2100 GRAPHICS 18
2110 POSITION 2,2:? #6;"KEEP TRYING!!"
2120 POSITION 2,6:? #6;"FINAL SCORE ";SC
2130 POSITION 2,10:? #6;"PRESS ANY KEY"
2135 POSITION 2,11:? #6;"TO TRY AGAIN"
2140 GET #1,K
2150 GOTO 98
2500 POKE HPOSP0,5:POKE HPOSP1,5:POKE HP
OSM0,5:POKE HPOSM1,5
2505 GRAPHICS 18
2510 POSITION 2,2:? #6;"CONGRATULATIONS!"
2520 POSITION 5,4:? #6;"SUCCESSFUL"
2530 POSITION 7,5:? #6;"MISSION"
2540 POSITION 2,8:? #6;"FINAL SCORE ";SC
2550 POSITION 2,10:? #6;"PRESS ANY KEY"
2553 POSITION 2,11:? #6;"TO TRY AGAIN"
2560 GET #1,K
2570 GOTO 98
3000 GRAPHICS 18
3010 POSITION 5,1:? #6;"MARTIAN"
3020 POSITION 5,3:? #6;"EXPLORER"
3030 POSITION 8,5:? #6;"by"
3040 POSITION 2,7:? #6;"martin j. cawley
"
3050 POSITION 2,10:? #6;"PRESS ANY KEY"
3060 POSITION 2,11:? #6;"TO START GAME"
3070 GET #1,K
3075 GRAPHICS 18
3080 POSITION 4,1:? #6;"INPUT NUMBER "
3090 POSITION 6,2:? #6;"1,2 OR 3"
3095 POSITION 4,3:? #6;"FOR REQUIRED"
3100 POSITION 2,4:? #6;"DIFFICULTY LEVEL
"
3110 POSITION 4,7:? #6;"1=NOVICE"
3120 POSITION 4,8:? #6;"2=EXPLORER"
3130 POSITION 4,9:? #6;"3=COMMANDER"
3150 GET #1,K
3160 IF K=49 THEN DF=1:FD=0.4:RETURN
3170 IF K=50 THEN DF=2:FD=0.45:RETURN
3180 IF K=51 THEN DF=3:FD=0.5:RETURN
3190 GOTO 3150
4000 GRAPHICS 7:SETCOLOR 2,0,0:COLOR 1
4008 PLOT 0,50:DRAWTO 2,55:DRAWTO 5,74
4010 PLOT 30,74:DRAWTO 36,70:DRAWTO 40,6
8:DRAWTO 43,63:DRAWTO 48,53:DRAWTO 50,50
:DRAWTO 60,55:DRAWTO 63,30
4020 PLOT 63,30:DRAWTO 78,50:DRAWTO 80,4
0:DRAWTO 87,36:DRAWTO 90,43:DRAWTO 105,5
3:DRAWTO 107,61
4030 PLOT 130,61:DRAWTO 135,55:DRAWTO 13
7,45:DRAWTO 143,42:DRAWTO 147,48:DRAWTO
159,60
4040 PLOT 0,6:DRAWTO 6,3:DRAWTO 8,0:DRAW
TO 15,5:DRAWTO 23,9:DRAWTO 25,12:DRAWTO
37,6:DRAWTO 45,3:DRAWTO 63,0
4045 PLOT 63,0:DRAWTO 73,7
4050 PLOT 73,7:DRAWTO 76,3:DRAWTO 79,2:D
RAWTO 81,0:DRAWTO 94,3:DRAWTO 120,7:DRAW
TO 129,4
4055 PLOT 129,4:DRAWTO 134,9:DRAWTO 142,
8:DRAWTO 148,14:DRAWTO 159,9
4060 COLOR 2
4070 PLOT 5,74:DRAWTO 30,74
4080 PLOT 107,61:DRAWTO 130,61
```

MICHAEL ORWIN'S ZX81 CASSETTES

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"Michael Orwin's £5 Cassette Two is very good value. It contains 10 stolid well designed games which work, offer plenty of variety and choice, and are fun."
from the ZX Software review in Your Computer, May '82 issue.

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machine code:
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CASSETTE 2

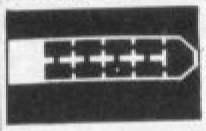
Ten games in Basic for 16k ZX81

Cassette Two contains Reversi, Awari, Laser Bases, Word Mastermind, Rectangles, Crash, Roulette, Pontoon, Penny Shoot and Gun Command.
Cassette 2 costs £5.

CASSETTE 3

8 programs for 16k ZX81

STARSHIP TROJAN



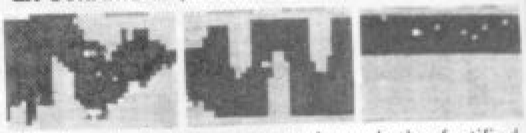
Repair your Starship before disaster strikes. Hazards include asphyxiation, radiation, escaped biological specimens and plunging into a Supernova.

STARTREK This version of the well known space adventure game features variable Klingon mobility, and graphic photo torpedo tracking.
PRINCESS OF KRAAL
An adventure game.
BATTLE Strategy game for 1 to 4 players.
KALABRIASZ World's silliest card game, full of pointless complicated rules.
CUBE Rubik Cube simulator, with lots of functions including 'Backstep'.
SECRET MESSAGES This message coding program is very txlp qexi jf.
MARTIAN CRICKET A simple but addictive game (totally unlike Earth cricket) in machine code. The speed is variable, and its top speed is very fast.
Cassette 3 costs £5.

CASSETTE 4

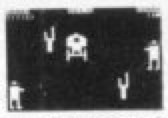
8 games for 16k

ZX-SCRAMBLE (machine code)

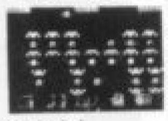


Bomb and shoot your way through the fortified caves.

GUNFIGHT (machine code)



INVADERS (machine code)



FUNGALOIDS (machine code)
GALAXY INVADERS (machine code)
Fleets of swooping and diving alien craft.
SNAKEBITE (machine code)
Eat the snake before it eats you. Variable speed (very fast at top speed)
LIFE (machine code)
A ZX81 version of the well known game.
3D TIC-TAC-TOE (Basic)
Played on a 4×4×4 board, this is a game for the brain. It is very hard to beat the computer at it.
7 of the 8 games are in machine code, because this is much faster than Basic. (Some of these games were previously available from J. Steadman).

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```
4100 PoKE 752,1
4110 SC=0
4115 ? "}"
4120 ? "SCORE";SC
4130 ? "FUEL          0
  100"
4140 ? "SPEED -60
  60"
4150 POKE 752,1
4160 RETURN
4200 GRAPHICS 7:SETCOLOR 2,0,0:COLOR 1
4220 PLOT 0,4:DRAWTO 20,7:DRAWTO 29,4:DR
AWTO 34,9:DRAWTO 42,8:DRAWTO 48,14:DRAWT
O 62,8:DRAWTO 77,17:DRAWTO 86,39
4230 PLOT 86,39:DRAWTO 89,40:DRAWTO 93,3
9:DRAWTO 104,24:DRAWTO 114,14:DRAWTO 119
,3:DRAWTO 129,7
4240 PLOT 129,7:DRAWTO 139,9:DRAWTO 147,
18:DRAWTO 152,30:DRAWTO 156,40:DRAWTO 15
9,42
4250 PLOT 30,61:DRAWTO 34,55:DRAWTO 37,4
6:DRAWTO 43,42:DRAWTO 46,46:DRAWTO 47,50
:DRAWTO 57,59:DRAWTO 59,60
4255 PLOT 59,60:DRAWTO 64,49:DRAWTO 66,4
7:DRAWTO 69,49:DRAWTO 79,75:DRAWTO 87,73
:DRAWTO 96,64:DRAWTO 113,42:DRAWTO 119,3
8
4260 PLOT 119,39:DRAWTO 122,37:DRAWTO 12
4,39:DRAWTO 112,68:DRAWTO 114,79
4265 PLOT 134,79:DRAWTO 138,69:DRAWTO 14
6,61:DRAWTO 153,60:DRAWTO 159,63
4270 PLOT 0,48:DRAWTO 5,53:DRAWTO 7,61
4275 COLOR 2:PLOT 7,61:DRAWTO 30,61:PLOT
 114,79:DRAWTO 134,79
4295 RETURN
4300 GRAPHICS 7:SETCOLOR 2,0,0:COLOR 1
4315 PLOT 24,76:DRAWTO 26,72:DRAWTO 33,6
3:DRAWTO 41,61:DRAWTO 48,63:DRAWTO 56,73
:DRAWTO 64,78:DRAWTO 69,79
4320 PLOT 69,79:DRAWTO 77,74:DRAWTO 82,6
9:DRAWTO 87,70:DRAWTO 94,79:DRAWTO 124,7
6:DRAWTO 131,69:DRAWTO 133,55
4325 PLOT 133,55:DRAWTO 139,42:DRAWTO 13
8,36:DRAWTO 134,29:DRAWTO 122,22:DRAWTO
108,19:DRAWTO 92,20:DRAWTO 69,23
4330 PLOT 0,19:DRAWTO 4,14:DRAWTO 9,8:DR
AWTO 19,5:DRAWTO 27,8:DRAWTO 37,18:DRAWT
O 44,30:DRAWTO 48,42
4335 PLOT 48,42:DRAWTO 59,49:DRAWTO 72,5
4:DRAWTO 81,54:DRAWTO 97,49:DRAWTO 104,5
1
4340 PLOT 37,18:DRAWTO 30,6:DRAWTO 31,3:
DRAWTO 43,1:DRAWTO 59,4:DRAWTO 99,0:DRAW
TO 103,3:DRAWTO 114,5:DRAWTO 126,0
4345 PLOT 126,0:DRAWTO 136,2:DRAWTO 144,
5:DRAWTO 154,14:DRAWTO 159,39
4350 PLOT 149,69:DRAWTO 151,59:DRAWTO 15
6,55:DRAWTO 159,57
4355 PLOT 0,47:DRAWTO 9,39:DRAWTO 12,38:
DRAWTO 14,39:DRAWTO 3,68:DRAWTO 4,76
4360 COLOR 2
4365 PLOT 4,76:DRAWTO 24,76:PLOT 131,69:
DRAWTO 149,69
4385 RETURN
5000 X0=62:X1=62:Y0=171:Y1=178
5010 YM0=197:YM1=207:XM0=188
5020 POKE HPOSP0,62:POKE HPOSP1,5:POKE H
POSM0,188
5040 A=PEEK(RAMTOP)-24
5050 POKE PMBASE,A:MYPMBASE=256*A
5055 POKE GRACTL,3:POKE SDMCTL,62
5060 POKE PCOLR0,0:POKE PCOLR1,0
5220 V=A+3
5225 P0=V+1:P1=V+2
5230 RES=USR(1612,V)
5250 DATA 12,30,63,51,30,30,51,33,33
5255 RESTORE (5250)
5260 FOR I=MYPMBASE+1024+Y0 TO MYPMBASE+
1032+Y0
5255 READ A:POKE I,A
5270 NEXT I
5275 DATA 12,12,30,30,63,30,30,12,12
5280 FOR I=MYPMBASE+1280+Y1 TO MYPMBASE+
1288+Y1
5285 READ A:POKE I,A:NEXT I
5290 DATA 3,3,3,3,3,3,0,0,0,0,12,12,12,1
2,12,12,12,12,12,12,12,12
5295 FOR I=MYPMBASE+768+YM0 TO MYPMBASE+
789+YM0
5298 READ A:POKE I,A:NEXT I
5400 RETURN
```

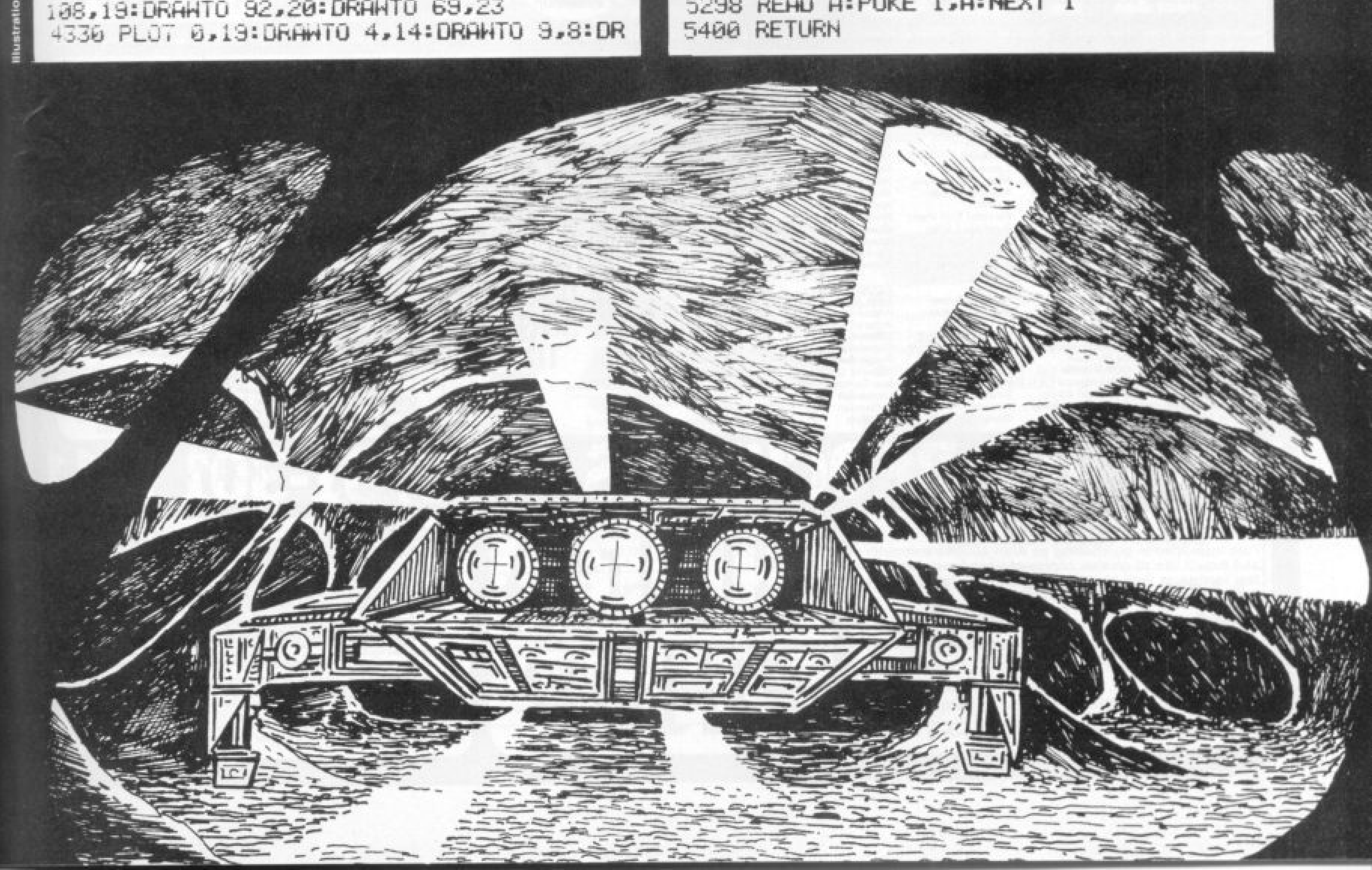


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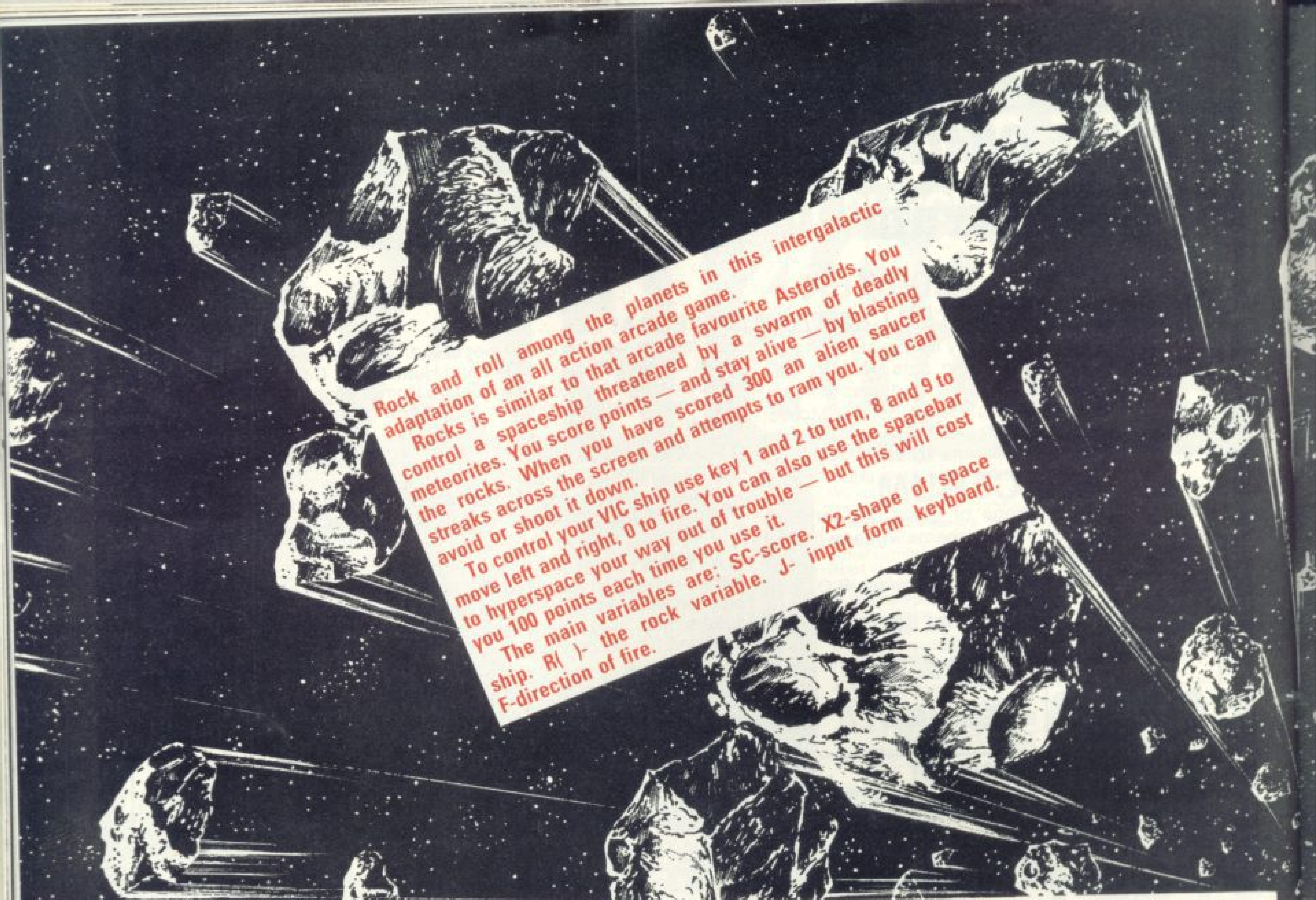
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Rock and roll among the planets in this intergalactic adaptation of an all action arcade game.

Rocks is similar to that arcade favourite Asteroids. You control a spaceship threatened by a swarm of deadly meteorites. You score points — and stay alive — by blasting the rocks. When you have scored 300 an alien saucer streaks across the screen and attempts to ram you. You can avoid or shoot it down.

To control your VIC ship use key 1 and 2 to turn, 8 and 9 to move left and right, 0 to fire. You can also use the spacebar to hyperspace your way out of trouble — but this will cost you 100 points each time you use it.

The main variables are: SC-score. X2-shape of space ship. R( )- the rock variable. J- input form keyboard. F-direction of fire.

```
1 DATA 191,2,191,2,191,2,207,8,223,8,0,4,219,2,217,2,213,2,231,8,223,8
2 DATA 0,4,219,2,217,2,213,2,231,8,223,8,219,2,217,2,219,2,213,12,0,4
5 DATA 16,16,16,16,16,16,16,16,0,0,0,255,0,0,0,0
6 DATA 64,0,1,16,0,64,1,130,0,0,0,0,0,0,0,0,0,0,0,0,0,0
7 DATA 68,108,124,40,56,16,16,0,8,12,14,28,252,122,38,1
8 DATA 0,224,120,46,120,224,0,0,1,38,122,252,28,14,12,8
9 DATA 0,16,16,56,40,124,108,68,128,100,95,63,56,112,48,16
10 DATA 0,7,30,116,30,7,0,0,16,48,112,56,63,95,100,128
11 DATA 1,2,4,8,16,32,64,128,128,64,32,16,8,4,2,1
13 DATA 60,60,126,65,255,255,60,60,12,28,30,127,255,255,252,56
15 DATA 0,8,24,56,48,32,0,0,0,0,56,252,255,255,127
16 POKE52,28:POKE56,28:CLR:POKE36878,15
17 POKE36879,25:PRINT"█████████*ROCKS*"
18 PRINT"████  << CONTROLS >>"
19 PRINT"█ 1 AND 2 TURNS SHIP":PRINT"█ 8 AND 9 MOVES SHIP":PRINT"█ 0 FIRES A BEA
M"
20 PRINT"██   TO JUMP HYPERSPACE     USE THE SPACE BAR"
21 FORZ=1TO22:READA:POKE36876,A:POKE36875,A
22 READB:FORX=1TOB*100:NEXT:POKE36876,0:POKE36875,0:NEXTZ
23 PRINT"██PRESS ANY KEY TO START"
24 GETA$:IFA$=""THEN24
30 FORA=232TO382:READB:POKE5120+A,B:NEXT
35 FORA=382TO470:POKE5120+A,PEEK(32768+A):NEXT
40 POKE36869,253:POKE36866,PEEK(36866)OR128
50 SC=0:X2=34
60 X=7901:X1=5
65 POKE0,32
70 PRINT"█":POKE36879,8
80 FORA=7658TO7679:POKEA,33:NEXT:FORA=8164TO8186:POKEA,33:NEXT
90 FORA=7680TO8164STEP22:POKEA,33:NEXT
```

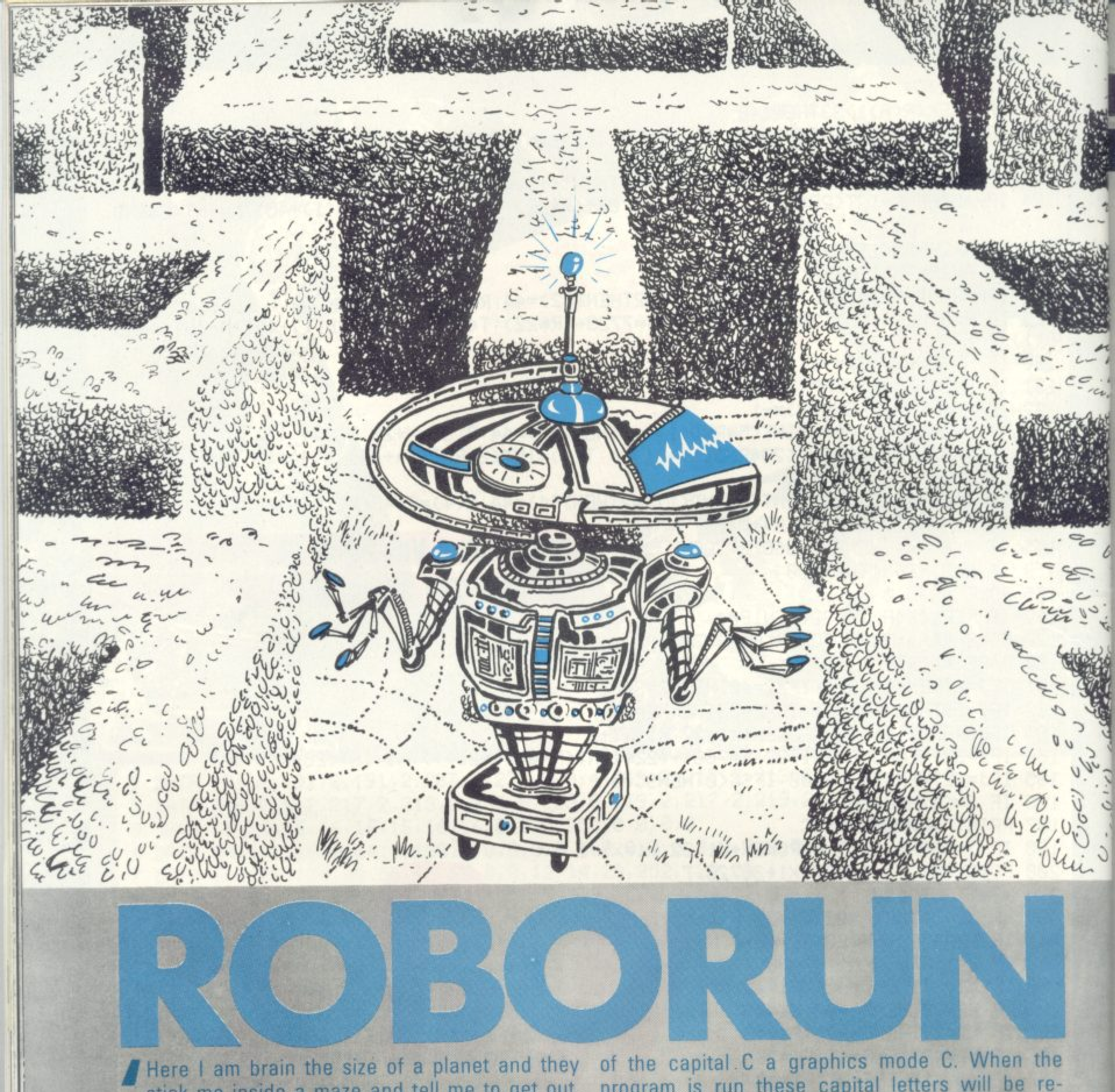
Illustration: Dorian Cross

ROCKS

RUNS ON A VIC-20 IN 4K

BY ANDREW STANFORD

```
100 FORA=1TO4
110 IF PEEK(R(A))>33THEN140
120 IFA=1THENR(1)=INT(20*RND(1)+7703):T(1)=INT(3*RND(1)+45):M(1)=INT(3*RND(1)+21
)
121 IF A=1ANDSC>300ANDINT(5*RND(1))=2THENT(1)=44:R(1)=7703+X1:M(1)=22
124 IFA=2THENR=INT(20*RND(1)):R(2)=7703+(R*22):T(2)=INT(3*RND(1)+45):M=INT(6*RND
(1))
125 IF A=2ANDM<1THENM(2)=23
126 IF A=2ANDM>1THENM(2)=-23
127 IFA=2ANDSC>300ANDINT(5*RND(1))=2THENT(2)=44:R(2)=X:M(2)=1
129 IF A=3THENR=INT(20*RND(1)):R(3)=7723+(R*22):T(3)=INT(3*RND(1)+45):M=INT(4*RN
D(1))
130 IF A=3THENM(3)=-21
131 IF A=3ANDM=2THENM(3)=21
132 IFA=3ANDM=1THENM(3)=-1
133 IF A=3ANDSC>300ANDINT(5*RND(1))=2THENT(3)=44:R(3)=X+20:M(3)=-1
135 IF A=4THENR(4)=INT(20*RND(1)+8143):T(4)=INT(3*RND(1)+45):M(4)=INT(4*RND(1)-2
3)
136 IF A=4ANDSC>300ANDINT(5*RND(1))=2THENT(4)=44:R(4)=8143+X1:M(4)=-22
140 POKER(A),32:R(A)=R(A)+M(A)
145 IF T(A)=44THENPOKE36876,200
150 IF R(A)=X+X1THEN600
155 POKE36876,0
160 IF PEEK(R(A))<>32THEN180
170 POKE R(A),T(A):POKER(A)+30720,A+2
180 J=PEEK(197)
181 IFJ=0THENX2=X2+1:IFX2=42THENX2=34
182 IFJ=56THENX2=X2-1:IFX2=33THENX2=41
183 IFJ=4ANDX1<15THENPOKEX+X1,32:X1=X1+1
184 IFJ=32THENPOKEX+X1,32:X=7681+(22*(INT(RND(1)*20))):X1=INT(20*RND(1))
185 IFJ=32THENSC=SC-100:IFSC<0THENSC=0
186 IF J=60THEN400
187 PRINT"[illegible]"SC
190 IF J=59ANDX1>5THENPOKEX+X1,32:X1=X1-1
200 POKEX+X1,X2:POKEX+X1+30720,7
300 NEXT:GOTO100
400 IF X2=34THENF=22:F1=29
401 IF X2=35THENF=23:F1=43
402 IF X2=36THENF=1:F1=30
403 IF X2=37THENF=-21:F1=42
404 IF X2=38THENF=-22:F1=29
405 IF X2=39THENF=-23:F1=43
406 IF X2=40THENF=-1:F1=30
407 IF X2=41THENF=21:F1=42
410 F2=X+X1:J=250
420 F2=F2+F:IFPEEK(F2)<>32THEN450
430 POKEF2,F1:POKE36877,J:J=J-2:POKEF2+30720,2
440 GOTO420
450 U=PEEK(F2)
455 IF PEEK(F2)<34ORPEEK(F2)>47THEN510
460 POKEF2,31
470 POKE36875,150:POKE36877,150
475 IFU=44THENSC=SC+50:U=32:GOTO490
480 SC=SC+10:U=32
490 PRINT"[illegible]"SC
510 FORW=X+X1+FTOF2STEPF:POKEW,32:NEXT
515 POKE36877,0:POKE36875,0:POKEF2,U
520 GOTO200
600 FORX=1TO1000:NEXT:POKE36869,240:POKE36866,150:POKE36879,25:PRINT"[illegible]":POKE368
78,0:END
```



ROBORUN

Here I am brain the size of a planet and they stick me inside a maze and tell me to get out. "Is that all," I said. "Yes," they said. Depressing isn't it.

So here I am in the maze trying to get out. I must admit it's turned out to be a bit harder than I thought. But don't tell them that. It appears this maze has three levels getting progressively harder each time.

They are controlling me by using keys 5 for left, 6 for down, 7 for up and 8 for right. There's some alterations that should be made to the program. But I'll let them tell you all about those.

When typing in the program from the listing a capital A should be used in the graphics mode place of the capital A's in the listing. A graphic mode B should replace the capital B and in place of the capital C a graphics mode C. When the program is run these capital letters will be replaced by the proper graphics. To alter the speed of the game the variable "V" in line 33 may be altered.

```
   1 REM ROBORUN ****
   2 BORDER 1: PAPER 1: INK 7: C
LS
   3 FOR n=144 TO 146
   4 FOR f=0 TO 7
   5 READ a: POKE USR CHR$ (n)+f
,a
   6 NEXT f
   8 NEXT n
  10 DATA BIN 00010000,BIN 00010
000,BIN 00010000,BIN 01010100,BI
N 00111000,BIN 01010100,BIN 0001
0000,BIN 00010000
  12 DATA 0,BIN 00100100,BIN 000
11000,BIN 11111111,BIN 00011000,
BIN 00100100,0,0
  15 DATA BIN 00111000,BIN 01010
100,BIN 00101000,BIN 01111100,BI
N 10111010,BIN 10111010,BIN 0010
1000,BIN 00101000,999
```

Illustration: Dorian Cross

RUNS ON A SPECTRUM IN 16K

BY PAT NORRIS

```
 17 LET y=0
 19 LET m$="8"
 20 LET f$="A                A
        A A"
 21 LET e$="A
        A A"
 22 LET c$="A             A
A             A"
 23 LET a$="A
             A"
 24 LET b$="A                 A
             A"
 25 GO TO 300
 30 LET l=20: LET j=3: INK 1
 31 LET m$="8"
 32 PRINT AT l,j;"C"
 33 FOR v=1 TO 5
 34 NEXT v
 35 PRINT AT l,j;" "
 40 GO TO 60
 55 IF INKEY$<>"" THEN LET m$=I
NKEY$
 60 IF m$="5" THEN LET j=j-1
 65 IF m$="6" THEN LET l=l+1
 70 IF m$="7" THEN LET l=l-1
 75 IF m$="8" THEN LET j=j+1
 80 IF l=0 THEN GO TO 900
 82 IF l>20 THEN LET l=20
 85 IF SCREEN$ (l,j)<>" " THEN
GO TO 800
 91 PRINT AT l,j;"C"
 92 FOR v=1 TO 15
 93 NEXT v
 94 PRINT AT l,j;" "
100 GO TO 55
300 PRINT "THE GAME OF 'ROBORUN
' CONSISTS"
302 PRINT "OF 3 COURSES, STARTI
NG AT"
304 PRINT "'A'(EASIEST) TO 'C'
(HARDEST)"
306 PRINT
308 PRINT "A ROBOT IS SITUATED
AT THE"
310 PRINT "LOWER LEFT OF THE SC
REEN AND"
312 PRINT "WILL BE MOVING TO TH
E RIGHT"
313 PRINT
314 PRINT "JUST GET THE ROBOT T
O THE TOP OF"
315 PRINT "THE SCREEN, E.G. OUT
 OF THE MAZE"
317 PRINT "TO WIN."
318 PRINT
319 PRINT "TO ALTER DIRECTION U
SE KEY 5"
320 PRINT "FOR LEFT, 6, DOWN, 7
, UP AND"
322 PRINT "KEY 8 FOR RIGHT"
323 PRINT
328 PRINT
330 PRINT "INPUT COURSE"
332 PRINT "E.G. A"
334 INPUT "input course",z$
335 IF LEN z$<>1 THEN GO TO 334
336 LET i=CODE (z$(1))-96
338 IF i<1 OR i>3 THEN GO TO 33
4
345 REM
346 CLS
347 IF y=1 THEN GO TO 374
348 PRINT "I forgot to tell you
 that"
350 PRINT "the wire in the maze
 is"
355 PRINT "ELECTRIFIED--don't b
ump into it."
358 PRINT
359 PRINT "The Robot doesn't st
op either"
360 FOR k=1 TO 500
370 NEXT k
374 CLS
376 INK 2: PAPER 7: BORDER 7: C
LS
380 GO TO (i+3)*100
400 PRINT AT 0,0;"A";TAB 31;"A"
405 FOR a=1 TO 7
410 LET b=INT (RND*29+1)
415 FOR c=0 TO 29
420 IF c=b THEN PRINT "  ";
425 PRINT "B";
430 NEXT c
435 PRINT a$
440 PRINT a$
445 NEXT a
450 PRINT AT 21,0;"A-----------
-----------------A"
455 GO TO 30
500 PRINT AT 0,0;"A";TAB 31;"A"
505 FOR z=0 TO 28
510 PRINT "B";
515 NEXT z
517 PRINT "A A"
520 PRINT e$
525 PRINT e$
530 FOR a=1 TO 8
535 LET b=INT (RND*13+1)
540 LET c=INT (RND*11+1)+13
545 FOR d=0 TO 24
550 IF d=b THEN PRINT "  ";
552 IF d=c THEN PRINT "  ";
555 PRINT "B";
560 NEXT d
561 PRINT "A A"
565 PRINT f$
570 PRINT f$
575 NEXT a
580 LET m=1
582 PRINT AT 21,0;"A-----------
-----------------A"
583 PRINT AT 20,29;" "
585 GO TO 30
600 PRINT AT 0,0;"A";TAB 31;"A"
605 LET q=INT (RND*10+22)
610 FOR z=0 TO 30
615 IF z=q THEN PRINT " ";
625 PRINT "B";
630 NEXT z
635 PRINT a$
640 PRINT AT 2,20;"A"
645 FOR a=1 TO 8
650 LET r=INT (RND*7+1)
655 LET s=INT (RND*6+1)+10
660 LET t=INT (RND*5+1)+20
665 FOR d=0 TO 25
670 IF d=r THEN PRINT "  ";
675 IF d=s THEN PRINT "  ";
680 IF d=t THEN PRINT "  ";
685 PRINT "B";
690 NEXT d
695 PRINT c$
700 NEXT a
710 PRINT c$
715 PRINT AT 18,20;" "
720 LET u=INT (RND*9+1)
725 FOR z=0 TO 30
730 IF z=u THEN PRINT " ";
735 PRINT "B";
740 NEXT z
745 PRINT a$
750 PRINT a$
755 LET m=2
756 PRINT AT 21,0;"A-----------
-----------------A"
757 GO TO 30
800 FLASH 1: BRIGHT 1: PRINT AT
 0,0;"ZZZZZZZzzzzzzaaappp": FOR
w=1 TO 50: NEXT w: FLASH 0: BRIG
HT 0
801 CLS : FOR w=0 TO 7: BORDER
w: PAPER w: INK 7-w: CLS : BEEP
.1,w+12: NEXT w
802 FOR w=20 TO 30: BEEP .05,w:
NEXT w
810 PRINT AT 10,0;"Try again (y
or n) or another    course(c)
"
815 LET y=0
820 INPUT l$
825 IF LEN l$<>1 THEN GO TO 820
830 LET y=1: IF l$(1)="y" THEN
GO TO 374
835 LET y=1: IF l$(1)="c" THEN
GO TO 334
840 IF l$(1)="n" THEN NEW
845 GO TO 820
900 IF i=2 THEN GO TO 930
905 IF i=3 THEN GO TO 950
910 PRINT AT 0,0;"Not bad": GO
TO 810
930 PRINT AT 0,0;"Getting bette
r": GO TO 810
950 PRINT AT 0,0;"Super Star":
GO TO 810
```


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MAL FUNCTION
T. HITCH
SNAG JNR
SCREAMING FOUL UP
THE BUGS
KEEP SPACE FOR SPACE INVADERS!
S.I CAPTN
IN
SO AS I SEE IT... YOUR FORCES WERE ENTITLED TO TAKE UP THESE NON-AGGRESSIVE POSITIONS IN THE SPACE ABOVE EARTH SO LONG AS YOU WERE WATCHING THE FLY-PAST BY SAUCERS FROM YOUR IMPERIAL FLEET...
..IN ACCORDANCE WITH THE INTERGALACTIC CHARTER ON GAMES PLAYING.
LASER BASE
SUPPORT YOUR LOCAL LASER BASE - STOMP ON A SPACE INVADER!
.. THE GATHERING OF SPACE FORCES GOES AGAINST THE VIDEO BOUNDARIES ACT SUBSECTION 24A, YOU SAY..
.. BUT, IF YOU WERE TO PULL BACK INTO AN OFF-SCREEN POSITION, I THINK THE LASER BASES WOULD BE WILLING TO RELINQUISH SOME PLANET TERRITORY.
SPROING!!
YOU CLAIM TO HAVE WIPED OUT SIX ENTIRE INVASION FLEETS FOR THE LOSS OF ONLY ONE LASER BASE, BUT THE INVADERS SAY THEY ONLY SUFFERED 'ACCEPTABLE LOSSES'!
SO I BLASTED A QUICK SALVO SKYWARDS!
AND THEY TURNED GREEN-RIGHT BEFORE MY EYES!
STARBAR
KPOW!
WELL, I'VE PIECED TOGETHER AN OUTLINE OF THE START OF THE CONFLICT AND ALL THE EVIDENCE SEEMS TO POINT AT ONE THING!
T. HITCH
YOU STARTED IT!!

REVERSI

BY JOHN BALL

SUBTLE USE OF THUMBS

The family Reversi champion can probably tell you the "do"s and "don't"s of the game.

These are the "rules of thumb" which most keen Reversi — also known as Othello — players will stick with, even though he may not have categorised them as such.

But the expert Reversi player/programmer will also know when to break those same rules.

In the last article on computerised Reversi (*C&VG* May) I outlined these rules. They were:

● Board Values, so that the nearer the corners the worse the move, but capturing corners being best. The whole game is really about capturing the corners to help you capture pieces permanently. I have included the values diagram below.

	a	b	c	d	e	f	g	h
8	-9	29	5	4	4	5	29	-9
7	29	22	3	2	2	3	22	29
6	5	3	1	1	1	1	3	5
5	4	2	1	○	●	1	2	4
4	4	2	1	●	○	1	2	4
3	5	3	1	1	1	1	3	5
2	29	22	3	2	2	3	22	29
1	-9	29	5	4	4	5	29	-9

● Piece capturing, where ironically it pays to take as *few* as possible to reduce your opponent's choice of moves.

● Side taking, which helps short-term "option-battles" but is bad in the end-game, so generally avoid them.

I said that a computer program based on those three points, if carefully balanced would result in a reasonable standard of play. But of course that is not the whole story. In my book *Key To Othello*, only half a dozen of the 36 pages deal with what I now call the three thumbs. The rest deals with other finer points that are really exceptions — in other words telling you when to give the "thumbs down".

The standard board values would strongly persuade you to avoid playing next to a corner, but look at diagram one. There is one square next to a corner that is safe — due to white holding the side. So a White play at A would be far prefer-

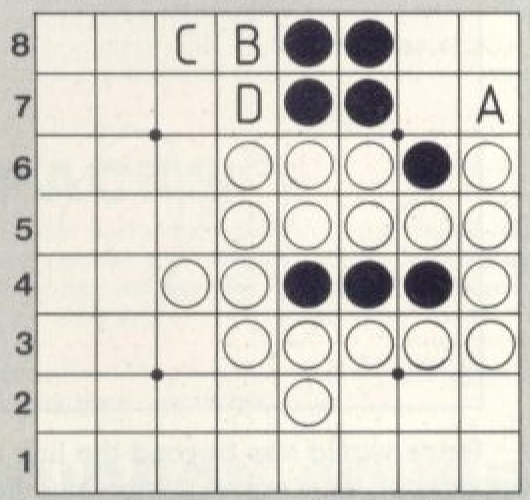


Fig. 1

able to B. B would provoke a Black reply at C, and give Black a future good play at D. So the values of the board squares change due to the position. They are not fixed.

The most obvious exception to Thumb two is near the end of the game when you need to take as many pieces as possible to win.

So at some point — say 10 moves from the end, you reverse the Thumb. That abrupt change is a bit crude, so that more subtle methods of selecting moves near the end are required.

For example, if the four squares of a corner are filled up with three pieces as in diagram two, then the empty square at E is almost certainly a must to play in. It is White's best move, so teach the computer to spot it. Generally, any corner with an odd number of squares is preferable to one with even.

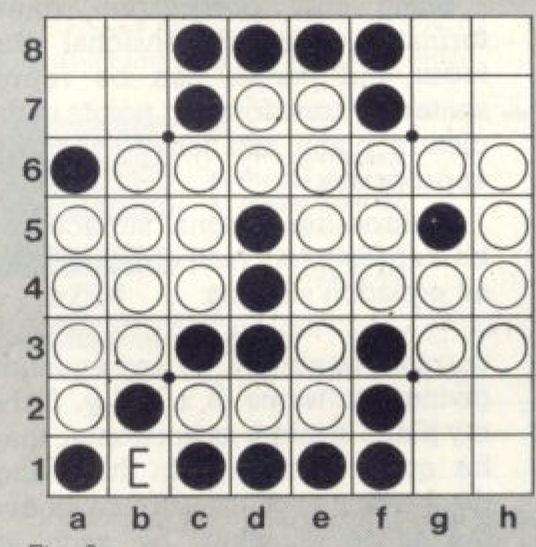


Fig. 2

Maximum piece capture *overall* is thus not best judged by captures per go — even near the end.

The Japanese Othello machine seen in the shops has the major weakness of taking thumb three to extremes — it hardly ever takes sides. In diagram three, you are fast running out of options as White, so you should take the side at F.

For a computer program, you have to teach it to count "options", so that when there are few "good" moves, you make it take sides more readily before it is too late and corners have to be given away! Yet if you had plenty of good moves, taking sides would invariably be wrong — especially if it meant getting a 5 — five pieces in a row along the side.

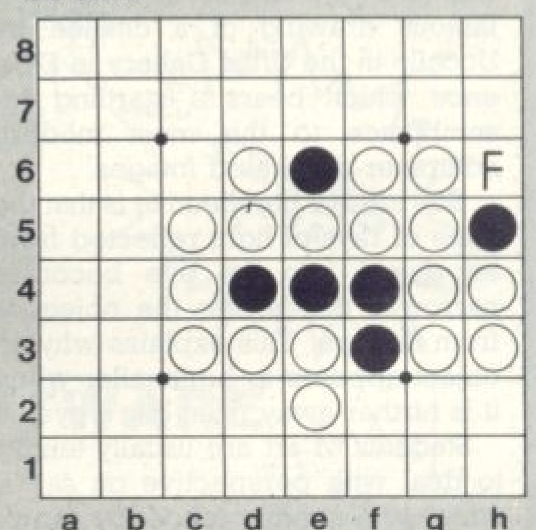


Fig. 3

Pattern Recognition

Ultimately you find exceptions to the above exceptions! This forms the basic human skill and knowledge of the experienced player.

The difficulty of transforming a good playing knowledge of Reversi into a good computer program, is that the game is so simple in format that many players find good moves by sheer instinct. It is turning that unconscious knowhow into hard and fast rules which enable you to write a worthy program.

There is a simple way of giving a computer this detailed knowledge. This is best left for another article.

Graphics

ALTERNATIVE DIMENSIONS

Any video game or simulation that deals with real events and scenes has to face the problem of how it can successfully represent the real three-dimensional world on a flat two-dimensional video screen.

The eyes and brain of every person have to cope with a similar problem because we see the world only via a flat image of it produced on the retina of the eye.

The secret of representing three-dimensional images in a realistic way on a flat surface was discovered by the artists of the Renaissance in the fifteenth century.

One of the set-pieces used for teaching perspective at that time was to draw a chalice, and there is a famous drawing of a chalice by Uccello in the Uffizi Gallery in Florence which bears a startling resemblance to the most modern computer-generated images.

The idea of perspective is that the cone of rays of light reflected from an object into the eye becomes narrower the further the object is from the eye. This explains why an object appears to be smaller when it is further away from one's eye.

Students of art are usually taught to deal with perspective on say a street or a straight fence, by drawing a "disappearing point" on the horizon, this is where the houses or fence would slip beyond the line of sight if they were to continue for ever. It works well on straight boulevards but more thought is needed on twisting or hilly terraces.

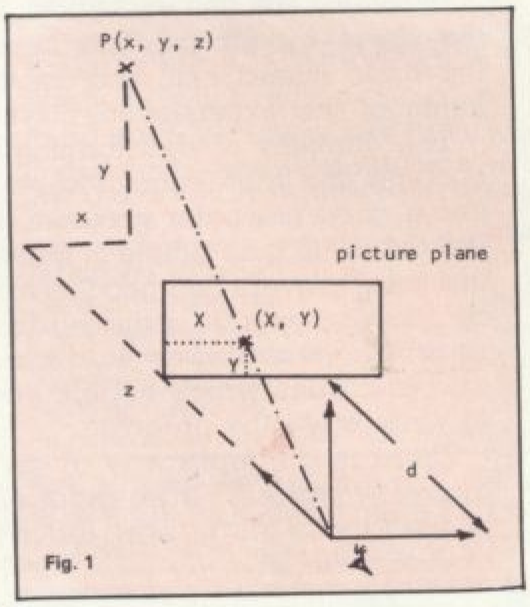
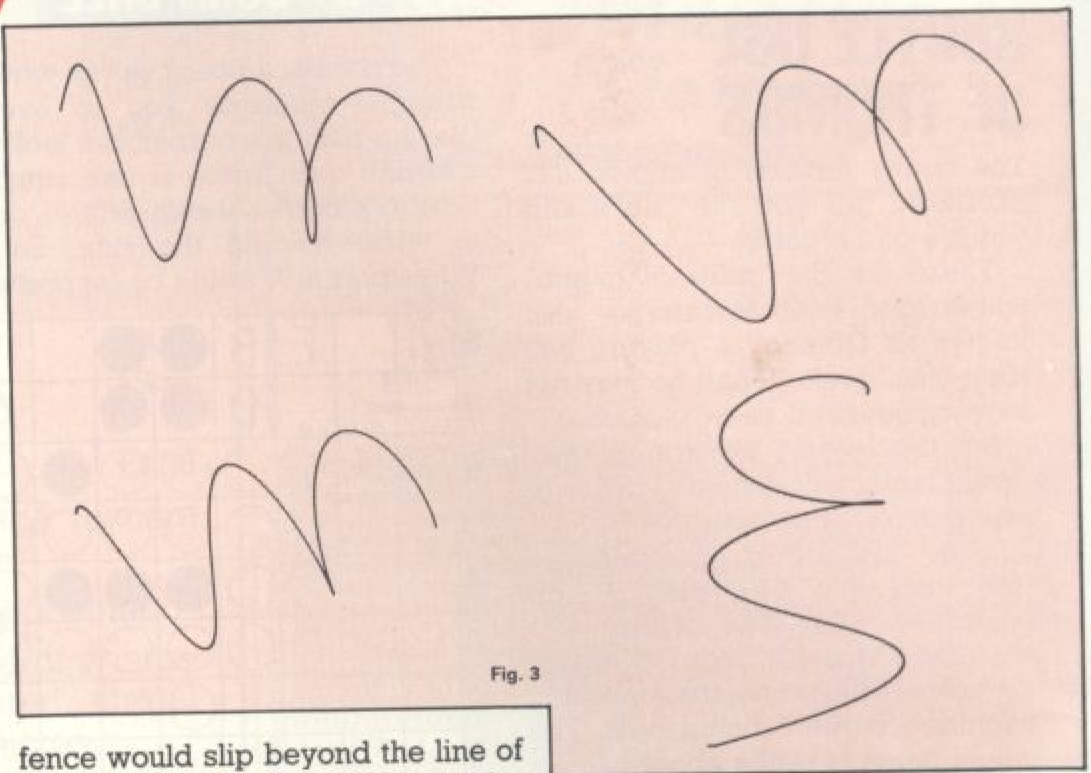


Fig. 1


Fig. 3

This idea naturally leads us to a way of representing solid objects on a flat surface. We can specify the position from which an object is being observed and the position of the flat surface on which it is to be represented as shown in figure 1.

The eye is at the origin of the coordinate system. The picture plane is parallel to the x-y plane at a distance d from the eye with *its* origin on the z-axis. A three-dimensional point with coordinates (x, y, z) can then be seen to correspond to the point (X, Y) in the picture plane, where

$$X = x * (d/z)$$
$$\text{and } Y = y * (d/z)$$

Using this perspective transformation, three-dimensional surfaces and curves can be represented by transforming points in the picture plane and joining them as appropriate.

A three-dimensional surface can be represented mathematically by an equation such as:

$$z = x^2 - y^2$$

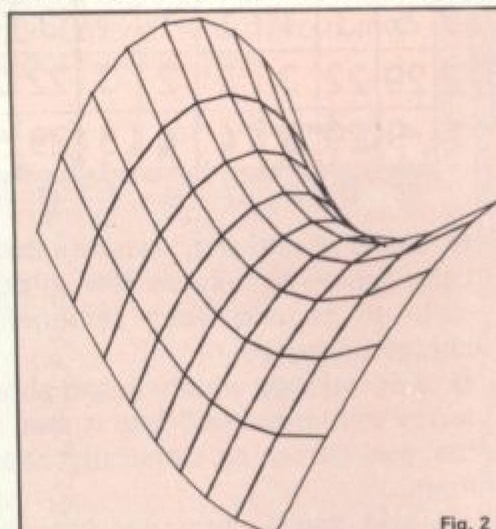
or, more generally, by any equation giving z in terms of x and y. If the x-y plane is taken as horizontal, then for every point (x,y) in this plane, the height, z, of the surface above the plane is given by such an equation.

A surface can be represented by a 'wire-frame' model obtained by taking a rectangular grid in the x-y plane, calculating the height of the surface above each cross-point of the grid and then joining these surface points. A part of the surface $z = x^2 - y^2$ drawn in this way is shown in figure 2.

A three-dimensional curve can be defined by the intersection of the two surfaces, and so it can be given mathematically by the equations for a pair of surfaces. Any point lying on two surfaces at the same time must lie on the curve in which they intersect each other. Part of the helix given by:

$$x = \cos(z/2)$$
$$\text{and } y = \sin(z/2)$$

is shown in figure 3 from several points of view.


Fig. 2

By Gary Marshall

GAMES SAY

You are in the hands of chance only if you believe in luck, according to ARNOLD ARNOLD. In this article he examines "so-called" games of chance — whether they are played on computers, on game boards or on the stock market.

Many game of chance players — generals, admirals, investors and habitues of gambling casinos — believe in luck. Good luck to them, but bad luck to those they command or whose money they invest.

Games, love and war can only be understood in terms of human behaviour (subjectively), machine behaviour (relatively objectively) or mathematically (with total objectivity).

The latter method can provide an understanding of all three, thanks to newly discovered mathematical techniques which merely confirm what some people have felt all along — although they usually get into terrible pub arguments.

The new mathematics of games ends such arguments because you can't argue with the facts.

For one thing the new mathematics demonstrates that luck and chance are human superstitions believed by those who want to evade responsibility for their own actions.

Let's start by pitching pennies — by hand or by computer. No luck is ever involved there. It all depends on whether or not you know what you and your game partner — human or computer — are doing.

If neither knows what he is doing, first one and then the other may win for a while. If both pitch pennies in a random, mindless manner for long enough, that game will end in a draw.

But if both players are perfect craftsmen and know how to manipulate the coin with precision, each will get what he wants every time.

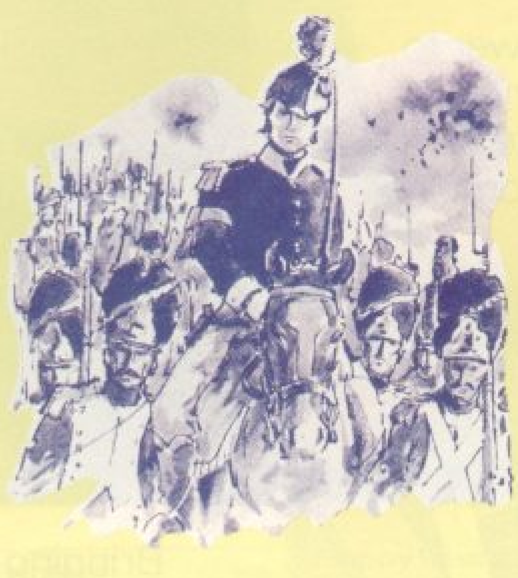
That's also a draw. The only genuine victory that can be achieved is when one player knows how to manipulate the coin perfectly and the other can't, and doesn't believe that this can be done.

The same principle holds true for war games and for actual warfare. All wars are based on dirty tricks. They constitute the only winning strategies — just as in pitching pennies. The idea in war is to create maximum confusion for the opponent so that he makes mistakes. Then you move in for the kill.

To try winning by brute force is stupid, expensive and eventually fatal. No one can keep that up forever, whether it's Alexander the Great, Ghengis Khan, Napoleon or Adolf Hitler.

But the available variety of dirty tricks is sufficiently great so that they will wear out and defeat any aggressor, no matter what he does, provided he can't wipe you out with the first blow.

Unless that occurs — and it is rare or impossible, except in nuclear war — he who strikes the first blow, or makes the first move in any game, suffers a severe numerical disadvantage. That disadvantage is precisely equal to the number of turns he enjoys, unless he knows how to play perfectly. This is a mathematically based



statement. Anyone can verify it by comparing the sum of choices available to the first moving player in Noughts and Crosses.

This disadvantage declines towards the end of the game, but then it doesn't matter any more. The game ends in a draw when the first moving player's numerical disadvantage declines to zero.

These facts are even true for games that are traditionally known as games of chance and luck. As every poker player knows, the player who makes the first bet is said to be under the gun. That is a very big disadvantage.

Given the new mathematics of games and a little self-discipline, anyone can win steadily and consistently at roulette, or any other so-called game of chance, unless the table is fixed, the croupier knows how to manipulate ball and table with relative precision, or the betting rules are rigged.

Except for random programming — that is nonetheless limited — or deliberate exclusion of certain combinations, computers can't be made to cheat. The limits of systematic machine randomization can now be defined mathematically.

That poses a threat for many who write game programs and for gambling casinos, but only from knowledgable players who are first rate mathematicians. The possibilities for human cheating may seem endless.

But even such cheating has its limits. Once all cheating methods are known, no-one can ever take advantage of anyone else.

One of the so-called winning ploys in what were believed to be games of chance consists of temporary alliances that are dissolved as soon as convenient. Then you turn on your former ally when he least expects it. That is virtually the only way to succeed at Monopoly, Risk and in other games in which such strategies are not expressly forbidden by the rules. But these realistic policies are difficult to apply in computer games, unless specifically allowed for in the program.

As in the previous article which dealt with Space Invaders, the difference between defensive and attack strategies become clear. As far as any attacker is concerned anything goes.

Defenders are best off with those they can count on to remain loyal, come what may. None of this involves any moral judgments. These are mathematically verifiable facts which are confirmed by experience.

The trouble with war games is that one wonders to what they lead?

What is won when the opposition is wiped out? In real life there is then no one with (or against) whom to play. In games, one war game can only lead to another. No chance, luck or fate is ever involved in either case.

Illustration: Jon Davis



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Printer specifications	Optional Printers MZ 80P4	MZ 80P5	MZ 80P6
Printing method	Serial impact dot matrix		
Feed method	Variable sprocket; Friction	Variable sprocket	Variable sprocket; Friction
Kinds of characters	230		
Character make-up	9(W) x 8(H) dot matrix (normal-size characters)		
Number of digits	136/68 per line 160/80 per line	80/40 per line 136/68 per line	
Printing speed	150 cps (normal-size characters)	80 cps (normal-size characters)	
Head sweep direction	Bi-directional		
Other functions	• Software-controlled full graphic function • Programmable number of lines per page • Battery-operated memory of HOME position (MZ 80P4 only)		

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Kit Korner

THE KEYBOARD QUESTION

For the unadventurous, replacing the keyboard on the Sinclair machines can seem a daunting task.

There is a large selection of possible keyboards now available, for the ZX81 in particular, and it can be confusing to decide exactly what you need from the keyboards and how much hardware you wish to fit inside the case.

Most of the models currently on the market have been produced in the same form for some time. They are usually about three-quarters of the size of a normal QWERTY keyboard which makes them especially attractive to users of the ZX81 who wish to keep their system as compact as possible. The case provided with many of the keyboards are even large enough to house the ZX81 itself.

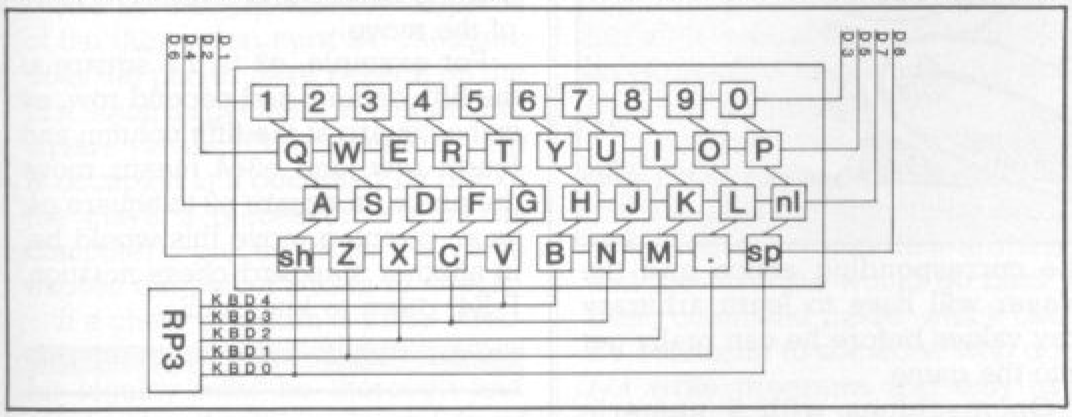
Unfortunately, for those who regularly use a full size keyboard, and are familiar with its "feel" there is, as far as I know, no alternative. That is, unless you are prepared to do a little modifying with knife and soldering iron. There are available, I know, several versions of unencoded matrix keyboard but as Sinclair uses a non-standard matrix, as shown last month, these are not suitable in their original form.

If you contemplate buying a full size keyboard for your ZX80/81/Spectrum try to get one in kit form. This will save you the job of having to unsolder all or most of the keys when you come to modify the matrix, as the connecting tracks are often on both sides of the board. If you are very lucky the top connections will be effected by wire links. This will make your job all the easier, as all you will have to do on this side is to rearrange the links. The trouble will come when the tracks on the bottom of the board have to be changed.

Fortunately, here, the most frequently used means of key connection is by soldering a fine wire in a very large plated-through hole. This will, as a consequence, mean that there will be plenty of room for the new connecting wires when you come to reassemble the board. After unsoldering the keys the next and most important step to take is to make a sketch of the board and all the usable connections.

It is no good rewiring the board and then finding out that you have made a wrong connection somewhere. It will invariably be in the most inconvenient place, according to Murphy's Law, chapter two.

Once you have convinced yourself that you have the matrix right, and you can refer to the diagram in last month's edition, the offending tracks must be cut and replaced by wire links. Do not remove the track at all, but cut through it with a very sharp knife. This will allow you, if you wish, to modify the board later to a different matrix without much trouble. I prefer to use single-stranded wire for this type of job but multistranded will do. Try to make the links as short as possible and as close to the board as you can — this will ensure the machine is robust.



On the board there should be a connector of some sort that would have taken the signal from the original matrix. You may decide to use this one or one of your choice. Whichever it is you will find it difficult to attach the same type of connector as is used by Sinclair unless you use the same sort of socket. These, fortunately, are generally available from "most good stores", as is the connecting strip.



The modification above can, of course, be made on almost any type of keyboard, even the encoded type, which normally has an RS232 output. This would become redundant if the matrix is changed, though. These keyboard are, however very expensive for a straight modification and it is possible to alter them for both forms of operation. This is a very tricky job as the matrix must work in both systems and should only be undertaken by those who know how the UART (look it up) functions.

Of course, second hand keyboards are available in junk shops and at computer bring-and-buy sales and many other places. These are ideal to practice on as they are cheap (as little as £5) for the associated electronics are often defunct.

You can make the most of the board by fitting extra sockets to take joysticks and other associated add-ons. Also, the boxes for these keyboards are large enough to take the machine, the power supply and the memory pack if you wish.

You would then be left with only the printer and any other controls you yourself had added, to carry separately.

BY KEITH MOTT

PRACTICAL PROGRAMMING

DO YOU TALK TO YOUR USERS?

Even some professional software tapes fall down in the vital area of communicating with the person who will end up using them.

Communicating instructions or other help in deciding what the computer next expects of its player is an important part of the games program and should be built into the program at an early stage.

There are two types of input routine: in the first type the program looks to see if an input is ready and continues if there is not, in the second the program stops until an input is ready.

The two forms are implemented in Basic by GET or INKEY$ for the first and INPUT for the second, although there are other differences.

GET and INKEY$ are extensively used in interactive action games, where the display and the state of the game must be continuously updated whether or not the player has done anything, while INPUT is more often used in games where turns alternate or in applications where the program processes data that is typed in.

In an interactive action game there is usually little difficulty in processing the result from a GET or INKEY$ instruction. It is often possible to have a single routine to handle the player's responses, which will work something like the following:

```
1000 GET A$
1010 IF A$ = "L" THEN GOTO 2000
1020 IF A$ = "R" THEN GOTO 2100
1030 IF A$ = "U" THEN GOTO 2200
1040 IF A$ = "D" THEN GOTO 2300
1050 IF A$ = "F" THEN GOTO 2400
1060...
```

According to the key pressed the program will branch to a routing to perform the appropriate action; if no key is pressed or if the key pressed has no defined function the program will continue.

WHICH KEY DOES THAT?

An important consideration in this type of program is the actual specification of which key does what. The keys and their functions should be easy for the player to remember; the above example satisfies this criterion if L, R, U, D, F stand for "move left", "move right", "move up", "move down", "fire". It is less satisfactory to use, say, the digits 1, 2, 3, 4, 5 as there is no immediate connection between the digit and the corresponding action and the player will have to learn arbitrary key values before he can really get into the game.



On machines with a numeric keypad separate from the main keyboard the keypad is often used to define direction of movement. With the standard layout:

```
789
456
123
0??
```

The keys 4, 6, 8, 2 can be used for left, right, up, down, and are easily remembered by their positions relative to 5. The keys 7, 9, 1, 3 can also be used for movement in the appropriate direction.

Another possibility is to use cursor control keys, if they are available, to implement directional movement.

IMMEDIATE RESPONSE

In the action games, considered above, the program responds to one key at a time and the response is immediate. The player is given no chance to correct an error, but since such games are mainly a test of speed and dexterity pressing the wrong key is one of the hazards of the game. However, in strategy games and data processing applications we need a different approach to errors.

As an example, consider the problem of checking the player's move in a game of chess. A standard format for specifying the squares on the board and the moves is to label the columns, from left to right, with the letters a to h, and the rows, from bottom to top, with the digits 1 to 8.

A square is specified by the column letter and row digit, and a move is specified by giving the starting square and finishing square of the move.

For example, e2 is the square at the fifth column and second row, e4 is the square at the fifth column and fourth row, and e2e4 means move the piece on square e2 to square e4; as an opening move this would be, in another standard chess notation, P-K4, pawn to king four.

THE CHECKING PROCESS

The checking process can be divided into two parts: first, checking that the input string has a valid form for the specification of a move, and second, checking that a valid form specifies a legal move accord-

BY TED BALL

ing to the rules of the game.

To use some jargon, the first part of the checking process is a "syntactic" problem, while the second part is a "semantic" problem. The distinction is that syntax refers to form while semantics refers to meaning.

In general, syntactic problems are much simpler than semantic problems, and this is certainly the case in checking a chess move. The syntax for a move can be defined precisely as requiring exactly four characters of which the first and third are letters from a to h and the second and fourth are digits from 1 to 8. This can easily be checked by a simple routine, for example:

```
1000 IF LEN (M$) < >4 THEN
GOTO 2000
1010 IF MID$(M$, 1, 1) < "a" OR
MID$(M$, 3, 1)>"h"
        THEN GOTO 2000
1020 IF MID$(M$, 2, 1) < "1" OR
MID$(M$, 4, 1) > "8"
        THEN GOTO 2000
```

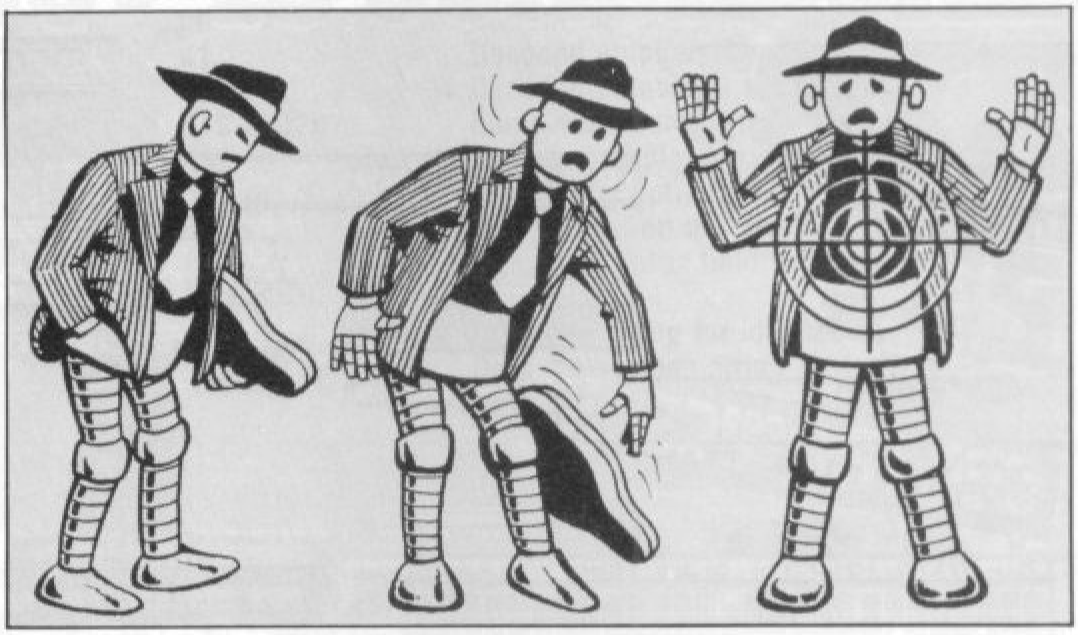
where line 2000 is the start of the error report routine.

ARE YOU SURE THAT'S LEGAL?

The semantic problem of deciding if a syntactically correct move is legal is much more complicated; too complicated to deal with fully here.

A little thought will reveal some of the things that must be checked: does the player have a piece on the first square specified; is the second square vacant; if the second square is occupied is it occupied by one of the player's pieces or one of the computer's pieces; does the move expose the player's king to check.

If a chess program is to be effective the routine that checks a move for legality must be thorough and efficient as the main use made of such a routine will not be checking that the player's moves are legal but in generating possible moves for the program. When the program is testing many lines of play for several moves ahead the move generator may be used thousands of times and must be very fast to avoid



Android Nim: "Get a move on we haven't got all day!"

unacceptably long times for deciding on moves.

In game programs where the rules and the format of the input are precisely defined it is always possible to make a complete check on the input for validity and legality, and this should always be done. A program should never accept an invalid move and all invalid inputs should be trapped by checking routines written into the program and not left to the programming language or operating system.

For example: in a gambling program if you try to bet 100 when you only have 50 the program should detect this and give a message like "You don't have that much, try again". If the program accepts the 100 it may later try to use the −50 left after subtracting 100 from 50 in an expression where negative numbers are inadmissable.

In that case you would get a system error message, "Function call error in 1234," or something similar. The program would then terminate and the machine would go back to Basic command mode, which could be confusing to someone who does not write programs and only uses his computer to run pre-recorded programs, and would be annoying to someone who had typed in 100 when he meant 10 and has been given no chance to correct his mistake.

In game programs, failing to trap an invalid input is at most annoying to the user, but in serious business and scientific applications it could be disastrous.

Although a games magazine is not the place to discuss such applications every programmer should appreciate the importance of data validation.

THE POLITE COMPUTER

As a corollary to the trapping of errors we should also give some though to the form of the error messages given after an error has been detected. All messages from a program should be informative and polite.

In some cases it may be sufficient to say simply "Error" or "Invalid command", in other cases it may be necessary to be more specific, for example in chess suitable error messages may be "That move would put you in check" or "You already have a piece on E4".

Regarding politeness in error messages you often find messages like:

"You can't go there, you rotten cheat" or, (a real example) in Android Nim, if you are slow in making a move you will be told: "Get a move on, we haven't got all day".

Such things may be amusing the first few times you see them but by the 100th time they are just annoying.

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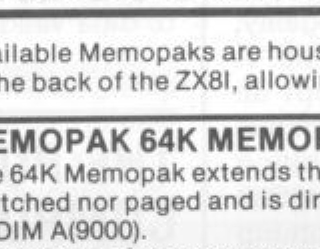
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Adventure

VARIABLE	DESCRIPTION
LN	Current location no. of player
K1	Decoded number of verb input
K2	Decoded number of noun input
Q1$ & Q2$	Computer's current reply
R3$	2nd word of player's input
O$ (n)	Object description array
P(n)	Object location no. array (if P(n)=50 it is held by player)
C(n)	Object flag
E$(n)	Exit code string for location n
D$(n)	Destination code string for loc'n 'n'

FIGURE ONE

Flags are objects seldom found in Adventure games, but they often play a useful part hidden in the program. We will arrange for an array C(n) to provide a flag for each object, and its value to be negative if the object must not be taken.

Consider a location numbered (say) 4, a garden. Lying around innocently at other locations will be found a SPADE (object No. 5), a BEAN (No. 9), a BUCKET (No. 12) and a pond. Figure 1 will remind you of the relevant variable names.

The objective will be to dig a hole, plant the bean, and grow a beanstalk. Before it can grow to its full height it must be watered.

The command DIG will return a value of K1 when decoded and via an ON K1 GOTO (line no) statement, control will pass to line (say) 5000:

```
5000 REM 'DIG' ROUTINE
5010 IF P(5)< >50 THEN LET Q1$=
"NOTHING TO DIG WITH": GOTO
100
5011 REM THE FOOL FORGOT THE
SPADE!
5020 IF LN< >4 THEN LET Q1$ =
"NOT HERE!": GOTO100
5021 REM MUST BE IN GARDEN
5030 IF C(5)< >2 THEN LET Q1$ =
"NOT AGAIN!": GOTO100
5031 REM ONLY ONE HOLE PER-
MITTED
5040 LET Q1$ = "OK":LET C(5)
=3:LET L$ (4)=L$(4)+ "WITH A
SMALL HOLE":GOTO 100
5041 REM C(5)=3 - HOLE IS DUG
```

By having increased C(5) by 1 we can control a PLANT routine:-

```
6000 REM 'PLANT' ROUTINE
6010 IF K2< >9 THEN LET Q1$= "I
CAN'T PLANT A "+R3$:GOTO 100
6011 REM K2 = DECODE NO. FOR
BEAN & ONLY BEAN CAN BE
PLANTED
6020 IF P(9)< >50 THEN LET
Q1$ = "I've NOT GOT ONE" :GOTO
100
6030 IF LN< >4 THEN LET Q1$ =
"NOT HERE":GOTO 100
6031 REM ONLY IN GARDEN
6040 IF C(5)< >3 THEN LET Q1$=
"NO HOLE IN SIGHT":GOTO 100
6041 REM MAKE SURE DIGGING IS
DONE
6050 LET Q1$="OK":LET
C(5)=4:LET L$(4)="GARDEN":LET
P(9)=LN:LET C(9)=-1:LET O$(9)=
"BEAN-SHOOT":GOTO 100
6051 REM (1) C(5) NOW SAYS
BEAN IS PLANTED
(2) HOLE REMOVED FROM LOCA-
TION DESCRIPTION
(3) LOCATION OF BEAN FROM
PLAYER TO GARDEN .
(4) BEAN MADE UNTAKEABLE
(C(9) IS -VE)
(5) BEAN DESCRIPTION
CHANGED TO 'BEAN-SHOOT'
```

Now the plant must be watered. Note that C(12)=2 for an empty bucket and 3 if bucket contains water.

```
7000 REM 'WATER' ROUTINE
7010 IF P(12)< >50 OR C(12)< >3
THEN LET Q1$="NO WATER"
:GOTO 100
7011 REM NO BUCKET, OR NO
WATER IN IT!
7020 IF K2< >9 OR LN< >4 THEN
Let Q1$ = "SPLASH!": LET C(12) =
2:GOTO 100
7021 REM IF NOT BEAN OR GAR-
DEN WATER GOES TO WASTE
7030 IF C(5) <4 THEN LET Q1$="I
DON'T UNDERSTAND":GOTO 100
7031 REM IF BEAN NOT PLANTED
7040 IF C(5)=4 THEN LET
Q1$="OK":LET Q2$="BOY — DID
IT GROW! "LET C(12)=2:LET
0(9)="BEANSTALK":LET E$ (4)
=E$(4)+"U":LET D$(4)=D$(4)+"37"
:LET C(5)=6:GOTO 100
7041 REM GIVES NEW EXIT UP
AND NEW DESTINATION 37.
LOC'N 37 IS TOP OF BEANSTALK
7050 LET Q1$="OK":GOTO 100
7051 REM DEFAULT IF STALK HAS
ALREADY GROWN
```

If he took the right steps the player has now grown a beanstalk. We have prevented him from making any mistakes, and forced him to grow it exactly as we wanted . . . Hey Presto!

DEALING WITH THE WIZARD . . .

I typed "RUN" and "ARE YOU A WIZARD?" flashed on the screen. "YES", I lied.

"ENTER THE PASSWORD" commanded the computer. A wrong guess caused the Atom to call me a charlatan and terminate the game.

Next time round I admitted that I wasn't really a wizard, and found myself on a twisty road through a dense forest.

A hardy Adventurer will rarely venture anywhere exciting without a lamp, keys, and an axe. As I had now collected these essentials I guessed it must be time to enter the cavern up the road. But how to get in? The entrance was closed, and no amount of violence to rocks and doors helped. An extensive search for an alternative way in proved fruitless.

The computer suddenly announced "YOUR NEXT MOVE IS SO OBVIOUS I SHALL NOT MENTION IT" — so I cried "HELP". The Wizard was obviously still sulking from my earlier deceit, and refused.

I promptly typed in a short sharp phrase suggesting what should be done to the wizard, and to my dismay I read "THE DENIZENS OF THE ADVENTURE HAVE DELICATE EARS. GAME ENDED BY ORDER OF THE PROGRAMMER. J. SPILSBURY".

Eventually, of course, I got in to the cavern. The method was so obvious I shall not bother to tell you!!!

Atom Adventure from Program Power is in Basic and requires 12K of memory. The game's speed of execution was disappointing but this was more than compensated for by the game's chatty manner and novel turn of phrase.

by KEITH CAMPBELL

New ZX81 Software from Sinclair.



A whole new range of software for the Sinclair ZX81 Personal Computer is now available – direct from Sinclair. Produced by ICL and Psion, these really excellent cassettes cover games, education, and business/household management.

Some of the more elaborate programs can only be run on a ZX81 augmented by the ZX 16K RAM pack. (The description of each cassette makes it clear what hardware is required.) The RAM pack provides 16-times more memory in one complete module, and simply plugs into the rear of a ZX81. And the price has just been dramatically reduced to only £29.95.

The Sinclair ZX Printer offer full alphanumerics and highly-sophisticated graphics. A special feature is COPY which prints out exactly what is on the whole TV screen without the need for further instructions. So now you can print out your results for a permanent record. The ZX Printer plugs into the rear of your ZX81, and you can connect a RAM pack as well.

Games

Cassette G1: Super Programs 1 (ICL)
Hardware required – ZX81.
Price – £4.95.
Programs – Invasion from Jupiter. Skittles. Magic Square. Doodle. Kim. Liquid Capacity.
Description – Five games programs plus easy conversion between pints/gallons and litres.

Cassette G2: Super Programs 2 (ICL)
Hardware required – ZX81.
Price – £4.95.
Programs – Rings around Saturn. Secret Code. Mindboggling. Silhouette. Memory Test. Metric conversion.
Description – Five games plus easy conversion between inches/feet/yards and centimetres/metres.

Cassette G3: Super Programs 3 (ICL)
Hardware required – ZX81.
Price – £4.95.
Programs – Train Race. Challenge. Secret Message. Mind that Meteor. Character Doodle. Currency Conversion.
Description – Fives games plus currency conversion at will – for example, dollars to pounds.

Cassette G4: Super Programs 4 (ICL)
Hardware required – ZX81.
Price – £4.95.
Programs – Down Under. Submarines. Doodling with Graphics. The Invisible Invader. Reaction. Petrol.
Description – Five games plus easy conversion between miles per gallon and European fuel consumption figures.

Cassette G5: Super Programs 5 (ICL)
Hardware required – ZX81 + 16K RAM.
Price – £4.95.
Programs – Martian Knock Out. Graffiti. Find the Mate. Labyrinth. Drop a Brick. Continental.
Description – Five games plus easy conversion between English and continental dress sizes.

Cassette G6: Super Programs 6 (ICL)
Hardware required – ZX81 + 16K RAM.
Price – £4.95.
Programs – Galactic Invasion, Journey into Danger. Create. Nine Hole Golf. Solitaire. Daylight Robbery.
Description – Six games making full use of the ZX81's moving graphics capability.

Cassette G7: Super Programs 7 (ICL)
Hardware required – ZX81.
Price: – £4.95.
Programs – Racetrack. Chase. NIM. Tower of Hanoi. Docking the Spaceship. Golf.
Description – Six games including the fascinating Tower of Hanoi problem.

Cassette G8: Super Programs 8 (ICL)
Hardware required – ZX81 + 16K RAM.
Price – £4.95.
Programs – Star Trail (plus blank tape on side 2).
Description – Can you, as Captain Church of the UK spaceship Endeavour, rid the galaxy of the Klingon menace?

Cassette G9: Biorhythms (ICL)
Hardware required – ZX81 + 16K RAM.
Price – £6.95.
Programs – What are Biorhythms? Your Biohythms.
Description – When will you be at your peak (and trough) physically, emotionally, and intellectually?

Cassette G10: Backgammon (Psion)
Hardware required – ZX81 + 16K RAM.
Price – £5.95.
Programs – Backgammon. Dice.
Description – A great program, using fast and efficient machine code, with graphics board, rolling dice, and doubling dice. The dice program can be used for any dice game.

Cassette G11: Chess (Psion)
Hardware required – ZX81 + 16K RAM.
Price – £6.95.
Programs – Chess, Chess Clock.
Description – Fast, efficient machine code, a graphic display of the board and pieces, plus six levels of ability, combine to make this one of the best chess programs available. The Chess Clock program can be used at any time.

Cassette G12: Fantasy Games (Psion)
Hardware required – ZX81 (or ZX80 with 8K BASIC ROM) + 16K RAM.
Price – £4.75.
Programs – Perilous Swamp. Sorcerer's Island.
Description – Perilous Swamp: rescue a beautiful princess from the evil wizard. Sorcerer's Island: you're marooned. To escape, you'll probably need the help of the Grand Sorcerer.

Cassette G13: Space Raiders and Bomber (Psion)
Hardware required – ZX81 + 16K RAM.
Price – £3.95.
Programs – Space Raiders. Bomber.
Description – Space Raiders is the ZX81 version of the popular pub game. Bomber: destroy a city before you hit a sky-scraper.

Cassette G14: Flight Simulation (Psion)
Hardware required – ZX81 + 16K RAM.
Price – £5.95.
Program – Flight Simulation (plus blank tape on side 2).
Description – Simulates a highly manoeuvrable light aircraft with full controls, instrumentation, a view through the cockpit window, and navigational aids. Happy landings!

Education

Cassette E1: Fun to Learn series – English Literature 1 (ICL)
Hardware required – ZX81 + 16K RAM.
Price – £6.95.
Programs – Novelists. Authors.
Description – Who wrote 'Robinson Crusoe'? Which novelist do you associate with Father Brown?

Cassette E2: Fun to Learn series – English Literature 2 (ICL)
Hardware required – ZX81 + 16K RAM.
Price – £6.95.
Programs – Poets, Playwrights. Modern Authors.
Description – Who wrote 'Song of the Shirt'? Which playwright also played cricket for England?



Cassette E3: Fun to Learn series – Geography 1 (ICL)
Hardware required – ZX81 + 16K RAM.
Price – £6.95.
Programs – Towns in England and Wales. Countries and Capitals of Europe.
Description – The computer shows you a map and a list of towns. You locate the towns correctly. Or the computer challenges you to name a pinpointed location.

Cassette E4: Fun to Learn series – History 1 (ICL)
Hardware required – ZX81 + 16K RAM.
Price – £6.95.
Programs – Events in British History. British Monarchs.
Description – From 1066 to 1981, find out when important events occurred. Recognise monarchs in an identity parade.

Cassette E5: Fun to Learn series – Mathematics 1 (ICL)
Hardware required – ZX81 + 16K RAM.
Price – £6.95.
Programs – Addition/Subtraction. Multiplication/Division.
Description – Questions and answers on basic mathematics at different levels of difficulty.

Cassette E6: Fun to Learn series – Music 1 (ICL)
Hardware required – ZX81 + 16K RAM.
Price – £6.95.
Programs – Composers. Musicians.
Description – Which instrument does James Galway play? Who composed 'Peter Grimes'?

Cassette E7: Fun to Learn series – Inventions 1 (ICL)
Hardware required – ZX81 + 16K RAM.
Price – £6.95.
Programs – Inventions before 1850. Inventions since 1850.
Description – Who invented television? What was the 'dangerous Lucifer'?

Cassette E8: Fun to Learn series – Spelling 1 (ICL)
Hardware required – ZX81 + 16K RAM.
Price – £6.95.
Programs – Series A1-A15. Series B1-B15.
Description – Listen to the word spoken on your tape recorder, then spell it out on your ZX81. 300 words in total suitable for 6-11 year olds.

Business/household

Cassette B1: The Collector's Pack (ICL)
Hardware required – ZX81 + 16K RAM.
Price – £9.95.
Program – Collector's Pack, plus blank tape or side 2 for program/data storage.
Description – This comprehensive program should allow collectors (of stamps, coins etc.) to hold up to 400 records of up to 6 different items on one cassette. Keep your records up to date and sorted into order.

Cassette B2: The Club Record Controller (ICL)
Hardware required – ZX81 + 16K RAM.
Price – £9.95.
Program – Club Record Controller plus blank tape on side 2 for program/data storage.
Description – Enables clubs to hold records of up to 100 members on one cassette. Allows for names, addresses, 'phone numbers plus five lots of additional information – eg type of membership.

Cassette B3: VU-CALC (Psion)
Hardware required – ZX81 + 16K RAM.
Price – £7.95.
Program – VU-CALC.
Description – Turns your ZX81 into an immensely powerful analysis chart. VU-CALC constructs, generates and calculates large tables for applications such as financial analysis, budget sheets, and projections. Complete with full instructions.

Cassette B4: VU-FILE (Psion)
Hardware required – ZX81 + 16K RAM.
Price – £7.95.
Programs – VU-FILE. Examples.
Description – A general-purpose information storage and retrieval program with emphasis on user-friendliness and visual display. Use it to catalogue your collection, maintain records or club memberships, keep track of your accounts, or as a telephone directory.

How to order

Simply use the FREEPOST order form below and either enclose a cheque or give us your credit card number. Credit card holders can order by phone – simply call Camberley (0276) 66104 or 21282 during office hours. Either way, please allow up to 28 days for delivery, and there's a 14-day money-back option, of course.

sinclair ZX81 SOFTWARE

Sinclair Research Ltd,
Stanhope Road, Camberley, Surrey, GU15 3PS.
Tel: Camberley (0276) 66104 & 21282.

To: Sinclair Research, FREEPOST, Camberley, Surrey, GU15 3BR.
Please send me the items I have indicated below.

Qty	Cassette	Code	Item price	Total
	G1: Super Programs 1	30	£4.95	
	G2: Super Programs 2	31	£4.95	
	G3: Super Programs 3	32	£4.95	
	G4: Super Programs 4	33	£4.95	
	G5: Super Programs 5	34	£4.95	
	G6: Super Programs 6	35	£4.95	
	G7: Super Programs 7	36	£4.95	
	G8: Super Programs 8	37	£4.95	
	G9: Biorhythms	38	£6.95	
	G10: Backgammon	39	£5.95	
	G11: Chess	40	£6.95	
	G12: Fantasy Games	41	£4.75	
	G13: Space Raiders & Bomber	42	£3.95	
	G14: Flight Simulation	43	£5.95	
	E1: English Literature 1	44	£6.95	

Qty	Cassette	Code	Item price	Total
	E2: English Literature 2	45	£6.95	
	E3: Geography 1	46	£6.95	
	E4: History 1	47	£6.95	
	E5: Mathematics 1	48	£6.95	
	E6: Music 1	49	£6.95	
	E7: Inventions 1	50	£6.95	
	E8: Spelling 1	51	£6.95	
	B1: Collector's Pack	52	£9.95	
	B2: Club Record Controller	53	£9.95	
	B3: VU-CALC	54	£7.95	
	B4: VU-FILE	55	£7.95	
	ZX 16K RAM pack	18	£29.95	
	ZX Printer	27	£59.95	
	Post & packing – *only if ordering hardware*		£2.95	

TOTAL £ ____

I enclose a cheque/postal order to Sinclair Research Ltd for £ ____

Please charge my *Access/Barclaycard/Trustcard no.
**Please delete as applicable.*

Mr/Mrs/Miss

Address

NSA 12

WARTIME FLIGHTS OF FANCY

BATTLE OF BRITAIN

London's safety rests on your tactical ability as commander of crack fighter squadrons as you fight the Battle of Britain.

Nine fighter squadrons are at your disposal to beat off attacks from nine German bomber squadrons. Each bomber follows a different route towards its destination. If 100 or more German planes reach London the battle is lost.

The computer allows you to send instructions to individual squadrons and it controls the movement of British and German forces. But there are no graphics. To follow this wargame simulation you must use a map.

I am sure this will deter many potential buyers of the game and it certainly detracts from its realism. A sketch map showing the starting positions of the British forces is provided along with the cassette — which loaded first time — and the fairly comprehensive instruction leaflet.

The controls are easy to use, but you can't spend very long deciding what to do next. The program continually updates the squadron positions and status.

This, coupled with the fact that you are meant to use counters or a marker pen to follow the movements of the squadrons on the map, does not make the game very easy to play.

Commands you can send to your squadrons are: scramble, patrol, report, return to base and change course. You must follow each command with a squadron number.

If a British fighter comes within five kilometres of a German bomber an aerial battle occurs.

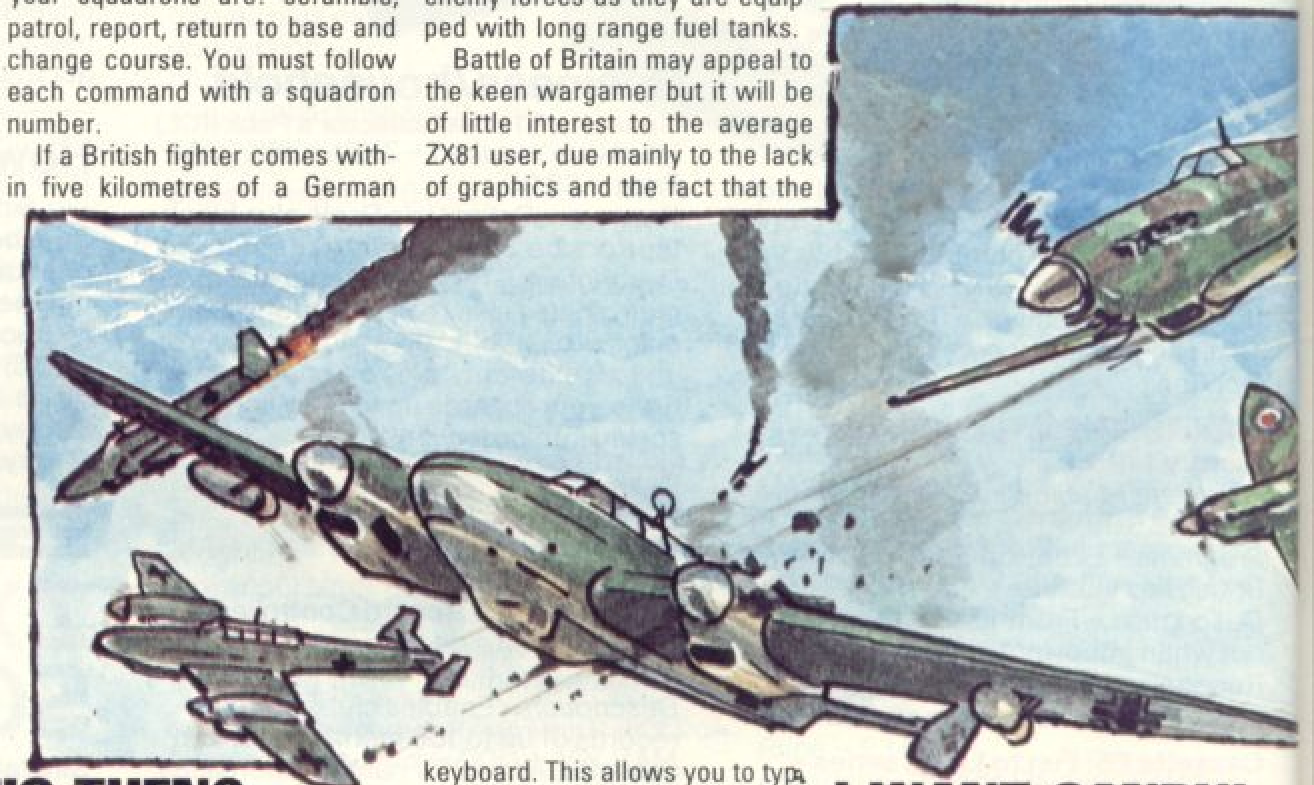
One minor criticism is that the computer simply displays the word "attacking" when squadrons are locked in combat and all contact is lost.

British fighters have to return to base for refuelling. A problem which does not plague the enemy forces as they are equipped with long range fuel tanks.

Battle of Britain may appeal to the keen wargamer but it will be of little interest to the average ZX81 user, due mainly to the lack of graphics and the fact that the game must be followed on a map. It is difficult to develop a good strategy, and the game generally lacks realism.

The program is also poorly written but with considerable rewriting it could be made into a stimulating simulation.

Battle of Britain runs on a 16K ZX81 and is available from Cambridge based Microgame Simulations for £4.95.



WHAT'S ALL THIS THEN?

MURDER AT AWESOME HALL

If you have ever had the inclination to be a detective, Murder at Awesome Hall will give you the opportunity to test your powers of deduction.

Written for the Atari 400/800 computers, Murder at Awesome Hall is very similar to the board game Cluedo.

Your job is to discover who murdered Colonel Awesome, which of the 20 rooms the murder was committed in and which weapon was used.

To assist in solving the mystery, you are provided with an on screen floor plan of both the ground floor and the first floor.

After entering a room, pressing Q allows you to discover who or what is in the room. If the room entered contains one of the Colonel's associates, you can question that person.

You can also consult your detective notes which list the contents of the rooms you have visited and the answers to your questions. By pressing L, a list of suspects and weapons will appear.

The computer will occasionally give you extra clues.

When you think you have the case solved press C on the keyboard. This allows you to type in your answer, but be careful — if your answer is wrong 5 points will be deducted.

You then have the option of having another try at solving the murder or giving up.

The game is not visually exciting and rapidly becomes boring.

Murder at Awesome Hall costs £14.50 from Calisto Software and requires 16K.



Illustrations: Jon Davis

I WANT CANDY!

CANDY FLOSS

When the sun is shining on Blackpool beach and Mum has only enough money for just one whispy sugary delight six-year-olds dream of becoming candy floss magnates.

Candy Floss will either make that dream come true or turn it into a nightmare of bad weather, miserable clientel and disruptive donkeys.

Candy Floss sets certain parameters for you to discover a recipe by trial and error, for success on the beach. You are given the cost of basic raw materials (sugar), the cost of advertising posters, and an accurate weather report. You have to decide how much candy to make, how many advertising posters to set up and at what price to offer your wares.

It comes, for the BBC model A or B, with a professional Star Trek program on the same cassette. All for £5.95 from Blackpool based I.J.K. Software.

JOURNEYS IN TIME AND SPACE

ADVENTURE

From dingy dungeons to inter stellar space. Acornsoft tempt you to travel these extremes with their Adventure package for the 12K Atom.

Attractively packaged within a lurid book type cover it stimulates the imagination with visions of wondrous worlds and fantastic deeds. All instructions for loading, running and playing and a brief outline of the three scenarios capable of being set up are included.

The program is loaded in three stages, the first being a file index read direct to screen, allowing tests for correct playback volume. Next, Advent is *LOADed. Taking about five minutes this gives you ample time to decide which game to play.

For the next stage a tape counter is a definite asset. As you *RUN the title of your choice the Atom reads it from tape, thus to load and play Intergalactic — the last game — takes about 21 minutes.

What do you get once loaded. Well, not a lot really. On the reviewed tape Intergalactic failed to RUN. An audible test revealed considerable deterioration in recording quality on the last few program blocks.



Of the two remaining games, House proved to be the most enjoyable. You explore a haunted house for treasures whilst bumping off its inhabitants.

Dungeon has you searching caverns for treasure.

A command word missing from the instructions is EXIT, this transports you from almost any scene in the games without you having to give directions.

Acornsoft's Adventure costs £11.50, which could be spent on a more worthwhile game.

MOUSKATTACK

WHERE THE RODENTS RUN RIOT

Larry Bain is a plumber with the Rodent Rooster Plumbing Service who installs pipes throughout the levels of Rat Alley.

This is a maze game and as in other games of this type, there is always a catch. In Mouskattack it is giant rats.

They infest the maze causing considerable hindrance to your plumbing activities. As protection against the rats, head office has issued you with two cats and two traps.

The trouble is the traps only hold the rats for a few seconds.

The cats are so scared that they will not even move, but they do scare the majority of the rats.

Unfortunately there are super rats in this maze and these simply eat the cats.

Periodically replacement cats and traps are dropped in the centre of the maze, but if they are not claimed quickly, they are retrieved by head office.

Once you have plumbed one maze completely, another maze commences with smarter rats. For every two screens cleared, you receive a bonus plumber.

The movement of your plumber is controlled by a joystick.

This game is very difficult as well as addictive making each game a constant challenge.

Mouskattack is available on disc for a 32K Atari from Gemini Electronics and costs £22.95.

ALIENS WILL GIVE YOU THE SHAKES

SHOCKWAVE

A huge mother ship, lights flashing, slowly approaches. Suddenly it drops a smaller saucer, which crashes down into the atmosphere with a tremendous boom.

No, its not a scene from the latest space movie but all part of Shockwave, written for the Tangerine Microtan (Micron) system. It's a game which, although infuriating and tricky, is totally different from any other space game I have yet seen.

You load the program at CUTS speed, then, type G400 to start the game.

The mother ship comes on and once in the middle of the screen starts to drop its alien offspring into stacks down each side of the screen.

Each stack holds five aliens, when the sixth alien enters a stack one drops from the bottom. To make things really hard, you can only shoot the aliens whilst in the stack.

The aliens do not shoot at you, they adopt a kamikaze action. When they drop from a stack, they plummet to the bottom line, where a small shockwave spreads out a little way either side, destroying your base if it's within range. Hence the name of the game. The mother ship also drops small saucers at random.

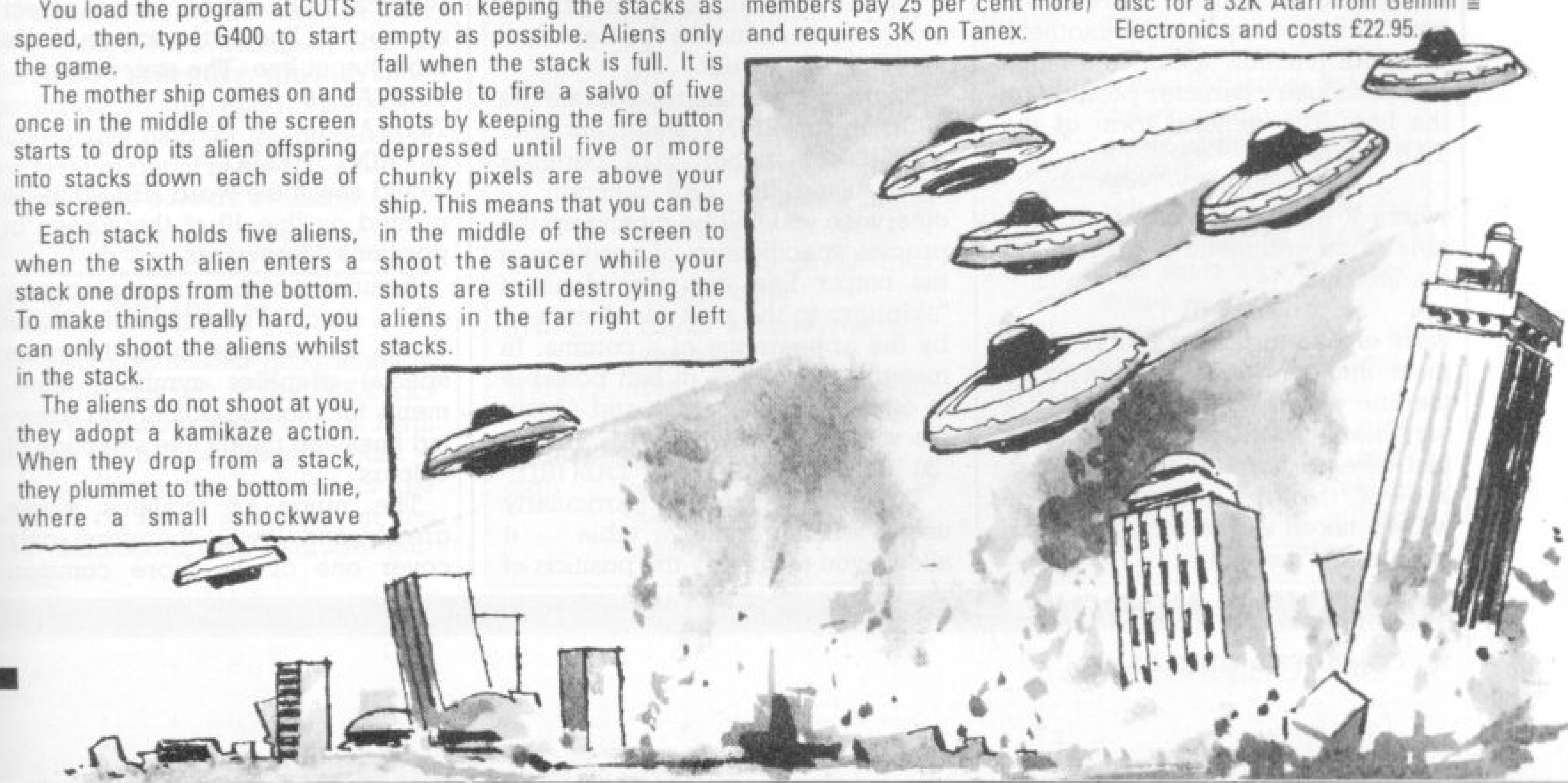
It is important to shoot down these saucers before they reach the bottom line as the shockwaves they generate spread out over the entire base of the screen.

A good strategy is to concentrate on keeping the stacks as empty as possible. Aliens only fall when the stack is full. It is possible to fire a salvo of five shots by keeping the fire button depressed until five or more chunky pixels are above your ship. This means that you can be in the middle of the screen to shoot the saucer while your shots are still destroying the aliens in the far right or left stacks.

It is impossible to move and shoot at the same time, but this is not too much of a disadvantage because you can fire five shots in quick succession and dash back into hiding.

One criticism is that the controls are not explained anywhere in the program or on the sheet which comes with the program — otherwise very addictive.

Shockwave is available from the Tangerine Users Group, at a members price of £5.62 (non-members pay 25 per cent more) and requires 3K on Tanex.



Illustrations: Jon Davis

DOWN TO BASIC

PRESENTATION IS VITAL

In all uses of computers, the presentation of the output is vital. This not only applies to games with a visual emphasis like Space Invaders, but also to business applications such as payroll systems.

In many cases, a lot of the time spent in designing and developing a program will be spent on the presentation of the output. The importance of this aspect of programming causes me to devote this month's article to the extra facilities provided in many versions of Basic to help programmers improve their display of information.

These extra facilities can be divided into two main categories: the extra forms of the PRINT statement provided to allow the programmer to specify precisely where results are to be displayed; and the special graphics statements sometimes available — such as the PLOT statement — which are particularly useful for pictorial displays.

EXTRA PRINT FACILITIES

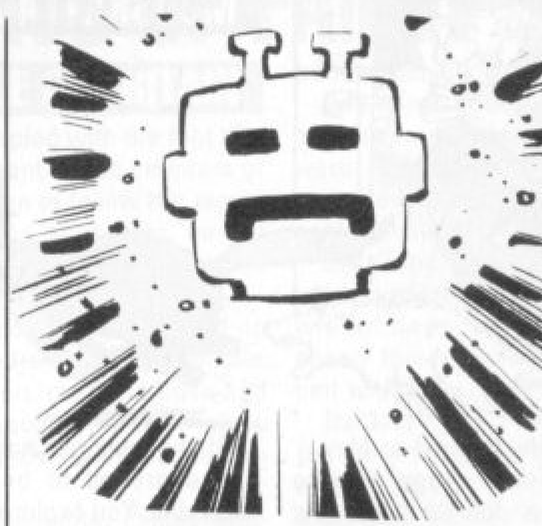
If the number of characters that can be printed on one line of the screen/paper is N, then you can think of each character position on a line as being numbered from 1 to N (N will vary from one system to another). The TAB function specifies a move to a particular character position on the line. The general form of the TAB function is

TAB(X)

where X may be a constant, a variable or an arithmetic expression. If the function

TAB(6)

were encountered in a PRINT statement, then a move to position six on the line would take place. If X is a variable or an arithmetic expression that takes a non-integer value e.g. X = 14.5, then the integer part of X will be taken as the required position (in this case 14).



The effect of using the TAB function is that printing will continue from the specified position. The statement

30 PRINT TAB (3);"FRED";TAB(10);Y

would produce the following output, assuming that Y had the value 1.25.

```
position 1 2 3 4 5 6 7 8
             F R E D
                          9 10 11 12 13 14 15 ...
                                1  .  2  5
```

The cursor will move to position 3 then print "FRED" in positions 3 onwards; it then moves to position 10 and prints the value of Y in positions 10 onwards.

The reason that the digit "1" appears in column 11 is that whenever a number is printed it is preceded by a minus sign, if it is negative, or a space, if it is positive.

Therefore, position 10 will contain either a space or a minus sign depending upon the value of Y. It is important to remember the space that precedes a positive number as it causes the values to be printed one position further to the right than might be expected!

It is also important to separate the items in the PRINT statement with semi-colons rather than commas when using the TAB function — otherwise you will be mixing up the precise specification of positions in the output line with the ideas of "skipping to the next zone" caused by the appearance of a comma. In many systems, it is in fact possible to omit the semi-colons and obtain the same effect:

30 PRINT TAB(3)"FRED"TAB(10)Y

The TAB function is particularly useful when printing a table — it allows you to specify the position of each column. The section of program

```
70 PRINT TAB(3);"NAME";TAB(10);"HEIGHT"
75 PRINT
80 FOR I=1 TO 3
85 PRINT TAB(3);N$(I);TAB(10);H(I)
90 NEXT I
```

could be used to output a table with the following format

NAME	HEIGHT
FRED	1.84
MARY	1.62
CECIL	1.97

I have described the effect of TAB(X) as being the printing of the next item in positions X onwards.

It should be pointed out that in some versions the effect would be to print the next item in positions (X × 1) onwards — the result being that everything is shifted one position further to the right than in the version I have described.

Some systems also have the statements HTAB and VTAB. These can also be used to specify the required position for printing — however, these appear not as part of a PRINT statement, but as statements in their own right before the appropriate PRINT statement.

HORIZONTAL HELLOS

HTAB (horizontal TAB) is similar to the TAB function in that it specifies the required position of the cursor on the output line. VTAB (vertical TAB) can be used to select a particular line on the screen as the next output line. The statements:

```
60 VTAB 10
70 HTAB 15
80 PRINT "HELLO"
```

would cause the word HELLO to be printed on line 10 of the screen in positions 15 onwards.

A number of the microcomputers offer special graphics facilities. These can include such things as special graphics symbols, statements for plotting points and drawing lines and things like selection of colours.

The range of facilities varies greatly and I will, therefore, only cover one of the more common

BY MOIRA NORRIE

statements — the PLOT statement in this article.

Before using the special graphics statements, such as PLOT, it is often necessary to indicate that you wish to enter "graphics mode". For example, on the APPLE II, you can use the statement

30 GR

to set the computer ready for graphical display — the screen will be set up with 40 rows and 40 columns which can be referenced by graphics statements, and 4 lines at the bottom of the screen reserved for text.

It is then possible to select a position on the screen to be "shaded" by use of the PLOT statement:

40 PLOT 20, 10

will cause the small area in column 20, row 10 to be shaded. The APPLE II has colour facilities and it is therefore possible to select a particular colour for shading by using the COLOR statement.

The number of different positions that can be selected will determine the amount of detail that can be produced in a picture produced in this way. The APPLE II system offers two levels of detail — low resolution and high resolution. If the statement

30 HGR

is given, then the high resolution option will be selected. In this case, the area of the screen used for graphics is divided into 280 columns and 160 rows.

Positions on the screen can then be selected for shading by use of the HPLOT statement, which is similar in use to the PLOT statement. The penalty paid for the increase in the level of detail is the reduction in the range of colours available.

NEXT MONTH

Many inexperienced programmers are baffled by talk of the PEEK and POKE operations. Next month, I will explain the use of these in detail.

In addition, the features of the version of Basic available on the BBC Microcomputer will be outlined.

THE CORE OF THE APPLE SYSTEM

The peculiarities of the Apple II Basic feature in this month's machine-by-machine breakdown of the language.

VARIABLES:

Variables names can be of any length but only the first two characters are distinguished.

If a variable name is followed by %, it is an integer numeric variable.

ARRAYS:

Can have multi-dimensional arrays.

STATEMENTS:

Can have more than one statement per line using a ":" as a separator.

The form of the IF statement is <line no.> IF <condition> THEN <statement(s)>

Either a STOP or an END statement can be used at any point in a program to terminate the execution.

The ON statement can be used to transfer to one of a list of line nos. depending upon the value of a given expression

<line no.> ON <expression> GOSUB <list of line nos.>

<line no.> ON <expression> GOTO <list of line nos.>

The ONERR statement can be used to transfer to a line no. if an error is encountered

<line no.> ONERR GOTO <line no.>

CLEAR	clears all variables.
DEF FN	declare user defined one-line functions.
GET	reads a character from the keyboard without displaying it.
POKE	writes specified value at specified memory address.
POP	causes the most recent subroutine return address to be deleted.
RECALL	retrieves an array from cassette tape.
STORE	records an array on cassette tape.
WAIT	used to suspend program execution.

FUNCTIONS:

ASC	returns the ASCII code of the first character in the specified string.
CHR$	converts code number to character.
FRE	returns the amount of free memory space.
LEFT$	returns the specified number of leftmost characters from a string.
MID$	returns a specified substring.
PDL	returns current value of specified games paddle.
PEEK	value of byte in specified memory address.
POS	returns the cursor position.
RIGHT$	returns the specified number of rightmost characters from a string.
SPC	used in a PRINT statement to supply spaces.
STR$	converts number to character string of digits.
USR	calls the user's machine language subroutine.
VAL	treats the specified string as a number.

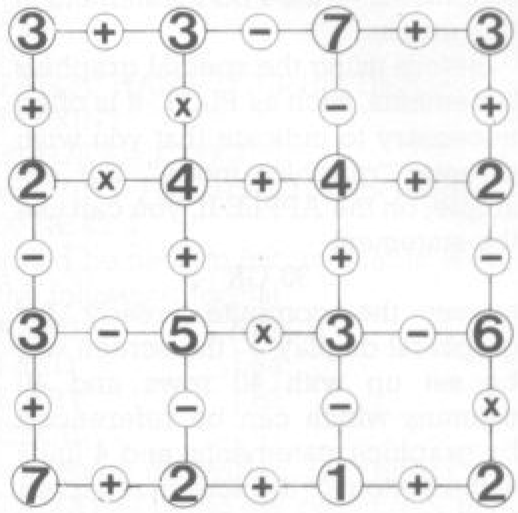
Plus ABS, ATN, COS, EXP, INT, LEN, LOG, RND, SGN, SIN, SQR, TAB, HTAB (horizontal TAB), VTAB (vertical TAB).

GRAPHICS:

Colour graphics facility statements COLOR and HCOLOR.

PLOT C, R	plots a "point" in column C, row R similarly for HPLOT C,R in high resolution graphics
DRAW	draws shape definitions set up in shape tables.
HLIN	draws horizontal lines in low resolution graphics.
VLIN	draws vertical lines in low resolution graphics.
ROT	sets angular rotation for shape drawn by DRAW.
SCALE	sets scale size for shape drawn by DRAW.
SCRN	returns colour code of specified point on screen.
SHLOAD	loads a shape table.
XDRAW	similar to DRAW but each point drawn in the complement of the colour already existing at that point on the screen.

Brainware



MIND ROUTINES

Starting at any of the above 16 numbers and by moving along the grid lines the object is to visit every one of the 16 numbers once and once only and keep a running total. The highest total wins. Send in your total and the path which obtains it.

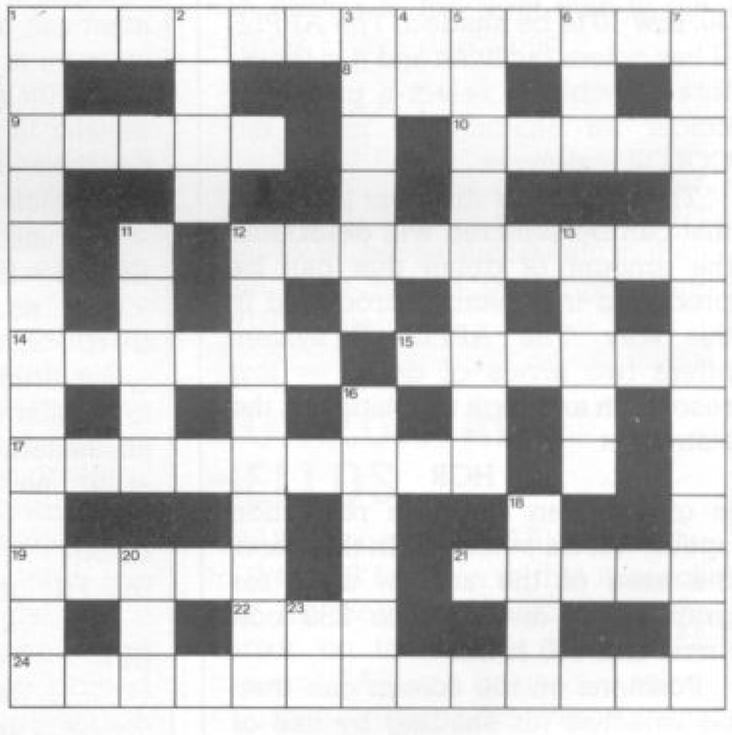
For example: moving along the top row:-

3+3−7+3 gives 2 as a subtotal.

● Winners of our June issue Brainware problems were: D. Bell of Willsden Green, London NW2 and A. Leigh of Redruth in Cornwall. Bottles of champagne are on their way to both. Two more bottles can be won for the first people out of the hat with this month's answers correct.

Answers to the July problems are on page 11.

NEVERA CROSSWORD



ACROSS

1. Distant management of channel changing (6, 7)
8. Zero-ten Duck game (3)
9. Good man, metal disk? (5)
10. Colourful puzzle innovator (5)
12. Putting together the SIN SYS (9)
14. Average statistical distribution (6)
15. Such hand and nerve are required by arcade games players (6)
17. Program language collector (9)
19. Adventure game nobleman finds nothing in the barn (5)
21. Horror one might get from static (5)
22. Adventure game Humanoid from Odel Forest (3)
24. Best form rotor rotating for video adventure game (5, 2, 6)

DOWN

1. Early sacrifice from the top chess nation (7, 6)
2. Creative from Adventure Game nesting in Gringo Green? (4)
3. Programming fish in force (6)
4. Animal back in the multiplexor (2)
5. Computer direction celebrity (5, 4)
6. Erase key without out (3)
7. Pedestrian Ending to Saint above us — a star in the Wars (4, 9)
11. Play these close to your chest (5)
12. Apple game for explosive astral people like you (9)
13. Cutting computer (5)
16. What a Galaxian does when he leaves formation (3, 3)
18. God painful with LISP (4)
20. It does nothing but is basically helpful (3)
23. Behold a function without force (2)

SOFTWARE GLOSSARY

A beginner's guide to plain jargon

ADVENTURE: A type of game in which the player has to take a character role and retrieve a number of treasures or objects by a trial and error process giving instructions to the computer. The player encounters a variety of hazards often taking the form of dangerous monsters, wizards and animals.

ARRAY: A series of items arranged to form a meaningful pattern.

BASIC: The most widespread computer language which is one of the easiest to learn and is used for programming all microcomputers.

BASIC COMMAND MODE: When you break into a running program it reverts to Basic command mode i.e. it will wait for new command instructions from the keyboard.

BUG: A slang term given to a mistake in a computer program which prevents it from working. It can refer to a mechanical, electrical, or electronic fault.

BYTE: A term to measure a number of Bits (BInary digiTS), usually there are eight bits to a byte.

COLOR: American spelling used to call colour out of several U.S. computers, e.g. the Apple.

CURSOR: A position indicator used by most computers to show where the next character should be entered.

DROP TARGETS: Targets on a pintable which retract upon being hit by the ball.

GET: A Basic command which tells the computer to scan the keyboard and return with either a numeric or string value.

GRAPHICS MODE: A mode in which the computer can produce graphical characters and displays.

HARDWARE: The general term given to all pieces of electronic and mechanical devices which make up a computer system, i.e. the actual machines.

INKEY$: A Basic command which checks the keyboard for input and places it in a string.

INPUT: Data or information which is fed into the computer.

K: See kilobyte.

KILOBYTE: A measurement of memory capacity. 1K is equal to 1024 so 8K is equivalent to 8192 bytes.

L.E.D.: (Light Emitting Diode) Provides a simple display and consists of an electron tube which lights up when electricity is passed through it.

LOAD: Instruction which is used in conjunction with a cassette recorder to transfer programs from tape to the computer's memory.

MATRIX: A rectangular array of numbers subject to mathematical operations.

PACMAN: The first ghost in the maze arcade game which has since been recreated in many forms and on many computers. Player takes control of a gobbling creature and eats dots in the maze while avoiding pursuing ghosts.

PLOT: To map or draw points on the screen.

RAM (RANDOM ACCESS MEMORY): This is a memory chip which you can load programs and data to and from.

RAMPACK: A cigarette-case sized pack of extra R.A.M. which plugs onto the back of a Sinclair ZX81.

RUN: Basic command word tells the computer to perform the numbered sequence of actions referred to as a program.

SOFTWARE: Another name for computer programs. It can also refer to computer documentation.

STARTREK: A popular computer game based on the TV series of the same name, in which the player takes command of the Starship Enterprise and roams the galaxy, destroying Klingons and investigating solar systems.

STATEMENT: An instruction in a computer program.

STRING: Usually represented by a $ sign on the computer keyboard, a string is a connected sequence of characters or words, usually placed within PRINT statements.

SYNTACTIC ERRORS: Typographical mistakes in program lines. Information put in the wrong order, information which conflicts with other information or program lines which refer to other unentered lines.

UART: Abbreviation for Universal Asynchronous Receiver Transmitter.

VARIABLE: A symbol whose numeric value can be changed at all times. It is used when writing programs.

HARDCORE

A GAMES PLAYER'S GUIDE TO THE ATARI 400/800

ATARI ADDITIONS

To date the only peripherals available in Britain are made by Atari itself.

Each piece of equipment which can be hooked up to the Atari 400 and 800 computers is a product of the firm covering almost every computer owners' need.

For loading programs into the machines there are two options open to you, either via cassette recorder or disc drives. The 400 computer can only be cassette loaded, but the more sophisticated 800 can use either method.

The Atari 410 Program Recorder looks like an ordinary tape recorder but there is one significant difference. To facilitate easy loading the volume levels are set for playback and recording to the correct pitch. You can use the Program Recorder to load and save programs which have been written in Atari languages. It is available from listed Atari dealers for £5.00.

For faster loading of programs Atari has produced a range of disc drives for the 800 series. A minimum of 16K memory space is needed to use the Atari 810 single disc drive which allows the use of one 5¼ inch floppy disc at a time.

The computer does have the facility to attach up to four single disc drives which gives you about 92K bytes. It costs £345.

Printed out information can be obtained on a printer which is plugged into the standard RS 232C interface. In Atari's range are two printers a 40 column thermal printer which prints out in dot matrix forms to a maximum of 40 characters per line. With the Atari 822 thermal printer comes an input/output data cable and an AC power adaptor. The price is costly at £265 for the unit.

An 80 column printing out 80 characters per line is also available from Atari dealers. Code named the Atari 825 Printer can carry out a variety of functions, with underscoring and backspacing capabilities. This device has to be used in conjunction with the Atari 850 Interface Module which has four RS 232C compatible ports.

The Atari 825 Printer is much more expensive at £550 and the interface module pushes up the total price by £135. However, the module allows you to expand the computer almost limitlessly.

Various cables used for connecting a variety of devices to the Atari 800 can be bought through Atari dealers. These include a printer cable for £28.50, an interface cable for £23.50, and RS 232C cable for £25.00, and a monitor cable which costs £25.00. Paper for these costs £4 per roll.

If you use the disc drive system you can buy a master diskette for £21.95 and a set of five blank diskettes for £16.

Add-ons for playing games are joysticks and paddles, the Atari standards, both costing £13.95.

SUCCESS STORY

In the last year Atari computers have taken off in the U.K. after enjoying success in America second only to the Apple Computer.

The main differences between the 400 and 800 computers is that the 400 cannot be expanded from its basic memory capacity of 16K, and it also has a sensory surface keyboard instead of the full typewriter keyboard which the 800 boasts.

With the 400 system comes the computer itself, a power adaptor which can be plugged into an ordinary outlet in your house, a switchbox which is connected into the back of the television and allows you to swop from TV viewing to computer operation. An operation manual is also given with the machine.

Software for the 400 comes in two forms, either cartridge or cassette. The latter must be loaded by tape recorder, the former can be plugged straight into the computer. You cannot change the information on the cartridges because they are ROM based and therefore not addressable.

SOFT SALES

Atari computers come into their own when it comes down to graphics and now software abounds for these machines.

But it is only during the last few months that firms have started to make available independently produced software as opposed to Atari-written software imported from America.

Gemini Electronics was one of the first firms to supply software in quantity and has made a point of adding the very latest and best games to its catalogue, as well as games written by its own programmers.

One of the newest is Mouskattack. This is a version of Pacman, but with a more complex maze. Atari itself offers a wide range of both games and business/personal software packages, all of which are available from distributors and dealers but not direct from Atari.

On the personal side there is a word processor on disc, mortgage and loan analysis, visicalc, sales ledger and purchase ledger, and a stock control package. Some of the software on Atari's books has been written by outside firms, in particular Thorn EMI.

Atari has recently added another software string to its bow in the form of the Atari Program Exchange (APX). Games from the catalogue can be obtained from Atari at PO Box 59, Alperton Lane, Wembley, Middlesex HA0 1FJ.

A GAMES PLAYER'S GUIDE TO THE ATARI 400/800

If you want to write any of your own programs you will need to buy the Atari Basic cartridge from any Atari dealer. Atari can supply you with a list of dealers and distributors on request. Atari Basic sticks closely to the industry standard Microsoft Basic but has additional commands to cope with graphics and sound.

Both the 400 and 800 have a number of features in common including 16 colours with 16 intensities, four independent sound synthesisers to facilitate musical tones or game sounds in four octaves. You can alter the volume and tone of the sounds which are emitted via an internal speaker.

There are 57 keys on an alphanumeric keyboard and four extra special function keys in both lower and upper case. Inverse video can be achieved and you can carry out on-screen editing. Graphics are Atari's strongpoint and there are 29 keys denoting graphics characters. The highest graphics resolution is 320 × 192 characters and the screen can handle 24 lines up to a length of 40.

Atari has recently brought the cost of its 400 down to £199.95. The 800 still retails at £599.

Many U.S. firms produce software compatible for the Atari 400 and 800 computers and these are now on tape from British distributors including Maplin Electronics, which has recently set up a software arm called Mapsoft. You can contact them by writing to PO Box 3, Rayleigh, Essex.

Another firm operating on the same lines is Calisto Computers. Calisto has an extensive range of games including Scott Adams adventures, and arcade favourites Ghost Hunter and Galactic Chase, for 16K machines costing £19.95 and £16.95 respectively. Calisto can be reached at 119 John Bright Street, Birmingham B11 1BE.

Holdco produce an intriguing adult only game entitled The Naughty One.

Other Holdco games include Gold, Peter Rabbit and the Magic Carrot (for children), Peter Rabbit and the Naughty Owl, Peter Rabbit and Father Willow, and Lord of the Rings, part 1. Holco is based at 14 Britton Street, London EC1M 5NQ.

A recently formed company currently devoted to Atari software is Centaursoft. The first two games to come off the production line are Skiing and TT Racer, both of which will sell for £19.95 at Currys.

Other software suppliers are Anglo American Software at 138a Stratford Road, Sparkhill, Birmingam B11 1AG. Software City which can be reached through Galaset, 30 Bayford Road, Littlehampton, West Sussex, and the West End Atari Centre at 114-115 Charing Cross Road, London WC2.

MEMORY SPACE

The Atari 400 comes in a standard 16K unalterable version — but owners can take the 800 up a grade.

The more sophisticated 800 can handle up to 48K memory. The way to expand the system is to plug in three 16K RAM pack cartridges. But remember that in reality you only have 40K of total addressable memory out of the 48.

Atari dealers and distributors should have stocks of these RAM packs which cost £65 each. In America the system can be upgraded to 128K via a Ramdisc from a firm called Axlon. These are not yet on sale in the U.K.

For most owners' purposes the Atari maximum is quite adequate. Further memory space is only necessary only if you want to build up vast data banks of storage capacity.

EASY READING

There are so many facets to this fine computer that it is difficult to know where to start.

The computer itself comes with comprehensive manuals and an excellent Basic book to start you on the road to programming. All of the books are in an easy to read style. If you are new to computers I can recommend the *Invitation to Programming* series.

This "listen and learn" series utilises the Atari cassette track which allows synchronised speech through the TV speaker. This combination of speech and computer graphics really make learning fun.

The Atari's modular concept has meant that I have expanded my 800 from 16K to 48K in easy stages. To increase the memory all that is required is a 16K RAM module. Lift off the top of the computer and plug it in the slot allocated. This modular concept is also applied to the computer languages and games. It is the work of seconds to remove Basic from the front of the machine and plug in Pilot or an assembly language cartridge.

If, like me, you find it necessary to buy a disk drive, a whole new world of software becomes available as well as languages such as Microsoft Basic, Pascal and Forth. Unfortunately it seems that more and more of the American software houses are issuing their products on disk, (the Atari is a top seller in the States and disk drives are common place) making a disk drive a must if you want to play some of the fantastic games that are becoming available.

One book I have found invaluable of late is *Your Atari Computer* by Lon Poole, published by Osbourne/McGraw-Hill. This book covers first principles and goes through to advanced programming.


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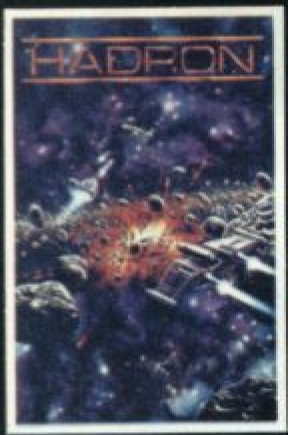
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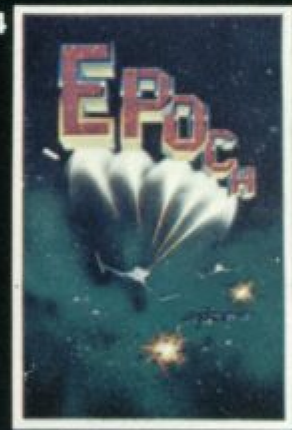
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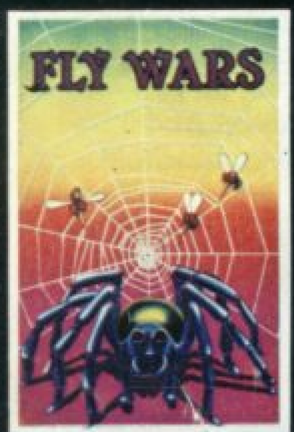
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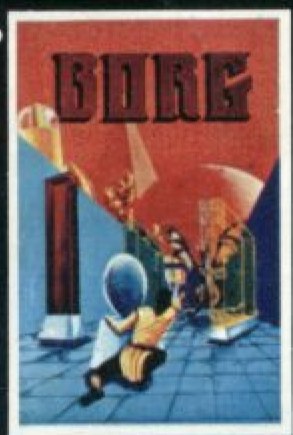
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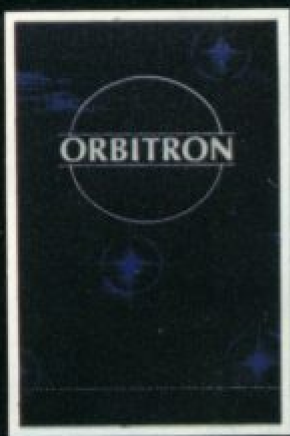
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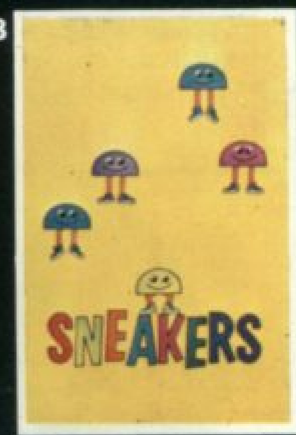
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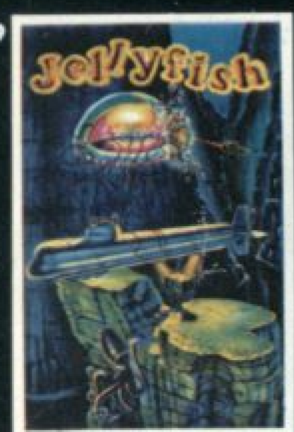
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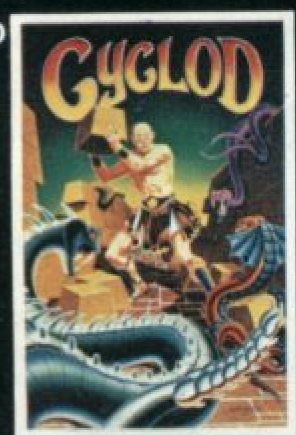
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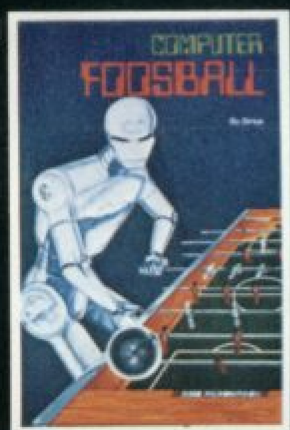
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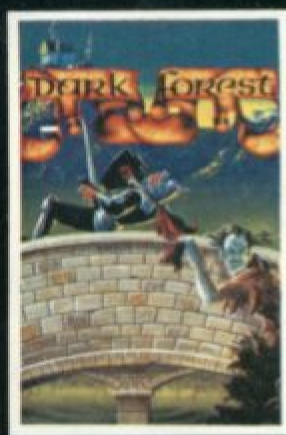
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